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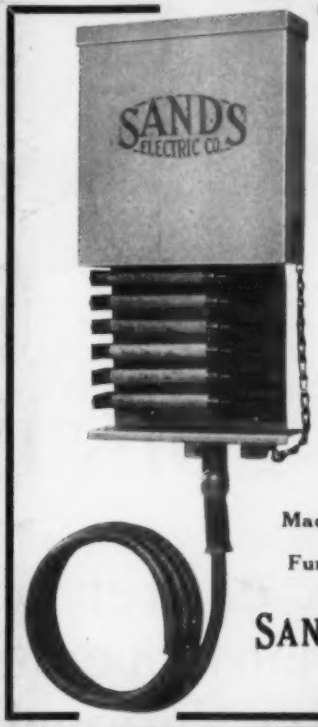

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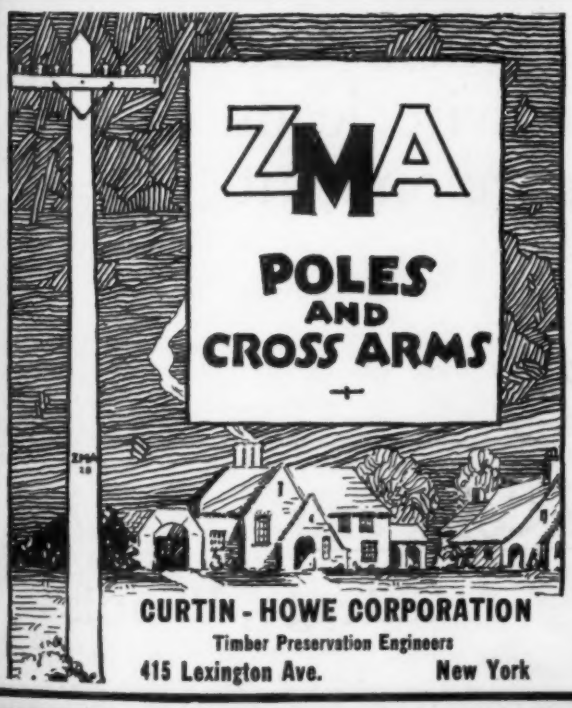

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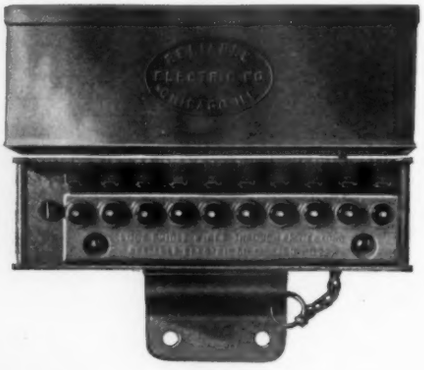

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TELEPHONE ENGINEER PUBLISHING COMPANY

J. A. SMITH, 192 N. Clark St., Chicago, President and Treasurer — C. L. JONES, Athens, Ohio, Vice-President

D. WEINER, 192 N. Clark St., Chicago, Secretary — F. A. BOWDLE, Cerro Gordo, Illinois, Vice-President

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Vol. 34 No. 11 — November, 1930.

SUBSCRIPTIONS:—The subscription price of TELEPHONE ENGINEER is $2.00 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries $4. Single copies, U. S. A., 20 cents.

Entered as second-class matter, June 6, 1922, at the post office at Chicago, Ill., under the act of March 3, 1879

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Telephone Engineer

Volume 34 NOVEMBER, 1930 No. 11

"Preparing for Tomorrow" Good News

Readers of telephone journals, as well as the metropolitan press have noted with much commendation that Associated Telephone Utilities System has announced a budget or $7,000,000 for its improvement of facilities and new equipment campaign for 1930. And in this commendatory greeting of progressive telephone action Telephone Engineer joins heartily.

Such a step by the Associated people means much in this day of industrial depression when labor and manufacturers need ways and means of getting back to normal prosperity. But it means much more than that. It means that the Associated people have a program of enterprise and telephone improvement that will both stimulate other companies to build larger and better and surely improve telephone service in a way which will mean better business for the whole industry. These premises are patent to anyone who can even glimpse the future.

And just here let it be said that improved telephone facilities is growing more and more imperative. Great stretches of telephone property that was built twenty to thirty years ago has exhausted its usefulness. Some of it is still in use and some has been kept in such efficient repair that it is giving fairly good service. But none of it is in condition to invite the growth of our business that would be easily accomplished with renewed and modernized apparatus. You cannot make a silk purse out of a sow's ear and neither can you give dependable telephone service with age worn, tumble down and obsolete equipment. You need no megaphone to inform telephone operators of this fact. They knew it thoroughly by experience.

Hence this reference to the promise of the Associated company of a business revival by both merit and patriotism. They assure the country that they will make a wide-spread showing of prosperity and at the same time popularize the telephone service they give into a condition wherein the dissatisfaction of patrons and the antagonism of legislators will be minimized into negligibility. That will be a happier and more prosperous day for the telephone business and the public.

Would that more telephone managements step forward with announcements of purposes, similar to the Associated, for 1930. All, of course, cannot do things in such a big way, but if all will give a proportionate boost for their own efficiency in United States telephone service, as a whole, it can be increased about thirty-three and a third per cent in the next year and our business will thrive accordingly.

More Revenue and Not Less Expense Needed

An outstanding feature of the many good things offered at the annual convention of the U. S. Independent Telephone Association was the address of President MacKinnon in which he stressed the importance, or rather the pressing necessity, of increasing our revenues rather than reducing our expenses—that is, the necessary expenses to keep our property free from lax deterioration.

To illustrate his fear for the future, in the matter of neglect of plant in order that interest and dividends may be paid, Mr. MacKinnon pointed to two recent receiverships for telephone companies that have been financially undermined by promoters who reckoned not only unwisely but foolishly and disastrously. The promoters had given notes to banks that speculative purchase money might be had and then when pay day came their income had not been sufficient to provide interest on the borrowed money and the outstanding bonds nor to pay dividends on the stock issued and then came the inevitable receivership.

"That proposition," Mr. MacKinnon says, "proves the saying that you cannot make something out of nothing" Furthermore, those of us who have been long in the telephone business know, absolutely, that no one can cut out upkeep expenses to pay interest and dividends and have any property left in the long run. One thing or the other must happen: Either you are going to stop operating your property or stop paying dividends. And either horn of the dilemma is disaster.

So what can be done? Probably nothing for the investors who purchased the securities unless there is management of the property which can go out

and raise more revenue, not necessarily by increasing rates, for that sometimes results in less revenue through patronage withdrawal. Instead, increase the business by additional patronage if it can be had and if not, like the boy who was called a bone head because he couldn't tell the traveler which way to get somewhere, replied: "Anyhow, I am not lost." The fellows who have paid speculative prices for property in a non-speculative field are either lost or those who put up the money for the plunge are facing a long, hard winter in the money market.

Such an outcome has not been unexpected to careful observers who have gone through the trials and tribulations of the school of experience in telephone property management. But, as Mr. MacKinnon sets forth, it is a condition and not a theory that confronts the safety of our property and we must meet mistakes made by the unsophisticated with fortitude and determination to maintain the integrity of our business and the efficiency of telephone service even if some misguided investors must lose. Let us get more revenue by going out after it and not cut expenses so telephone efficiency will be impaired. Any other course will invite hardship for all of us.

Men Want Work Rather Than Charity

Now is the season of discontent and fear for many idle men. It is not their fault that an industrial slump and consequent trade stagnation is besetting most parts of our country. And we, as telephone men, can relieve a whole lot of winter suffering if we will go to work now on the repairs and improvements we were planning for next spring and summer. The prices of material are so low we can afford to borrow money to pay for it until we expected to purchase and build in 1931. That will be helping both the factory workers and the deserving labor we can employ.

Not only will it be good business financially to do our next summer's work now but it will also be patriotic and charitable all in one act. Newspaper reports have it that surveys show four hundred thousand people out of employment, in the United States, and with winter coming on much suffering can be evaded by everybody with prospective work for the future to DO IT NOW. Most of the idle men and women in our country do not want charity. They abhor the idea of being dependent on benevolence for the winter and we can do a whole lot to avoid bread lines and empty community chests if we will all set about to furnish some employment.

And here is a suggestion: If telephone supply firms will give out the word that they will give ninety or a hundred days' time on all bills for supplies purchased now to make improvements that were scheduled for next spring and summer that will be an attractive inducement to buy and build now. And this can all be done without financial loss of any consequence whereas if it is not done by industrial firms generally we will all be compelled to dig deep in our treasuries and "give 'til it hurts" to prevent suffering from cold and hunger.

And while on this subject, the matter of whom to favor with employment is very important. Men with families should be put to work first and the spendthrifts and no-accounts should be given the opportunity to taste some of the bitterness which follows careless habits and reckless living. When Old Abe Martin said "Tilford Moots' daughter was arrested and fined for letting her motor run while soliciting aid from the trustee" he gave a wholesome warning to undeserving charity subjects. Too many people have been letting their motors run too much, but that does not relieve cold and hunger. So let us all remember that men want work rather than charity and if everybody who can furnish work will help a little it will mean more relief than charity can give.

Building 'Phone Property for the Future

In every telephone conference we attend the matter of building our property for the future is an uppermost topic on the program and in the discussions. And it has been handled from many viewpoints with the final conclusion, always, that it is cheapest and best to provide ample capacity on durable construction.

And what is ample capacity and durable construction? That is the question that agitates grey matter in almost every telephone meeting that is held, be it large or small, technical or novitiate. Ample capacity means provision for future growth so it will not soon become necessary to rebuild our construction to accommodate growing business and durable construction means the use of such materials and the putting together of it in such a way that it will withstand a much longer period of use and require much less upkeep than if cheap stuff, hurriedly thrown together, had been planned because it cost less at the time of construction.

Just how much any telephone plant may grow is, of course, problematical. In most instances ten or twenty years' census statistics will furnish a fairly accurate criterion of capacity needs. But it is always safest to provide enough extra to reasonably accommodate the unexpected. This for the reason that the extra cost of such ample provision is only in the material and better workmanship, both of which represent only a small fractional part of what it costs to rebuild for additional capacity. And, as to material, the cheapest usually proves to be the most expensive. Good poles, securely set in the ground and anchored, cross arms properly braced, and first class wire, of any kind you buy, well put up is always the most economic construction in the

long run. And it is really the only kind that will furnish dependable service. Other kinds may serve well for a time but not a very long time and not serve very well in comparison with the best.

It is not the purpose of this suggestion that the some expensive construction be used in a small plant that is necessary in a large one. The income would not justify such. But we have seen enough of the woes of "cheap john" construction to prove to all of us that it is neither economic nor efficient and that such investment is eventually a money waster rather than a money maker.

Building for the future means enough capacity on durable construction to keep our plant expenses at the minimum. That has proven to be the most satisfactory and profitable to all who have tried it.

Independent Problems Bared at National Convention

Leaders of Telephone Industry Gather in Chicago; F. B. MacKinnon Re-Elected President; Lay Plans for Handling Toll Compensation; Urge That Telephones Stay Under Interstate Commerce Commission; Objections Stated to Sale of Tri-State Properties to Northwestern Bell.

Plea for a united front on the toll compensation problem sounded off the 34th annual national Independent telephone convention held at the Hotel Stevens, Chicago, October 14, 15, 16 and 17.

The convention attendance was large, more than five hundred member companies being represented in addition to numerous telephone stations and supply organizations. Exhibition hall was crowded with exhibits, a total of fifty, displaying the 1930 developments and improvements of hundreds of different devices, equipment and apparatus used in telephone work.

In addition to the subject of the toll business, probably the most discussed subject throughout the convention, two other topics received a large share of the debate, namely the proposed sale of the St. Paul properties of the Tri-State Telephone & Telegraph Co. to Northwestern Bell, and the so-called Couzens bill, which provides that all communication companies—telephone, telegraph and radio—shall be put under one regulatory body.

President MacKinnon Discusses Toll Problems

F. B. MacKinnon, Chicago, president, United States Independent Telephone Association, gave a review of Independent telephone conditions in an address in which he tackled the problem of handling toll business. He said in part:

"The toll situation has been greatly accentuated during the last two years by the demands made upon telephone companies for toll service and by the program of the Bell companies in developing rapid-fire service. The latter included providing facilities beyond the present demands in order to take care of future demands, and the adoption of new methods, particularly in connection with underground cables and with the construction of large toll offices in city traffic centers.

F. B. MAC KINNON
Re-elected president of the United States Independent Telephone Association

"That problem involves every one of our companies. I think the basic part of it is the problem of compensation at the exchange. Then the ownership of the toll line is involved, as well as to what extent it is advantageous for the Independent companies to own toll lines, under what conditions they should be operated, and what the relationship should be with the Bell company in connection with handling that toll business.

"It is the opinion of some who have been giving considerable study to the matter that the whole question may be summed up in just one proposition—that the Independent companies must be satisfied agents. They must have an ample revenue to make them not only willing but glad to handle toll business.

"Toll business is a necessary part of our business; we have built up its importance in the public mind, and it is going to continue to be important."

Delegates from companies in certain states indicated that they were fairly well satisfied with the compensation arrangements, although fear was expressed that continued future reduction in toll rates by the Bell System would have a most adverse effect upon the earnings of the Independent connecting companies. The toll compensation contracts in one or two states were condemned in no uncertain terms.

It was generally believed that the national organization would give careful consideration to the matter of toll compensation. Consideration of the matter will await the results of a study of toll conditions at present being made under auspices of the Ohio Independent Telephone Association.

Urge That Radio and Telephone Remain Separate

President MacKinnon in his address also expressed the belief that within a few years the telephone industry will see a communications commission controlling all of the telephone, telegraph and radio companies.

The chief plea of the Independent telephone industry during the eight months in which Congress discussed the Couzens bill was, "Don't mix us now with the radio industry."

"Of course," said President MacKinnon, "we took occasion to point out a number of clauses in the proposed bill that we did not think practical when they were applied to the Independent companies. We have been able to have many of those clauses eliminated or changed. In all probability Congress will meet with our opinion—the opinion of the men in the industry—on those things; but they will not meet us, I

think, on the proposition that we shall remain separate from the radio.

"No one can say it is best we should be under the Interstate Commerce Commission rather than under some other commission. We must recognize that there will be federal regulation. The only point that we are particularly interested in, outside of the detail of regulation, is with whom we are being thrown and whether the regulation is going to be such as will be burdensome to us.

"It would be very burdensome to us to be united with radio. Radio is an undeveloped industry; it is in an experimental stage. It is still, as we have said, a manufacturers' battle, and it is going to be several years before many of the legal points of radio are going to be cleared up.

"Until that is done we think that the telephone industry should remain where it is—with the Interstate Commerce Commission. We are a stabilized industry. It would be very unfavorable for us to be thrown into the turmoil that exists in connection with the regulations of radio this fall. So when Congress meets again and we hear about the regulations bill, keep in mind this proposition."

Analyze Toll Lines Economically

An analysis of toll lines from an economic standpoint was given in a convention address by R. F. Wilder, general commercial manager, Tri-State Telephone & Telegraph Co., St. Paul, Minn.

"It is fundamentally sound to expect rates based upon cost of toll service to be lower in those areas where the greatest density of traffic exists. Toll service probably cannot be furnished at as low rates in Utah, Nevada or Wyoming as it can in the states of Minnesota and Iowa; and neither can the same rate schedule be furnished in Minnesota and Iowa with the same degree of profit it can be furnished in the New England and North Atlantic states, or other states where you have a relatively large number of cities lying close to one another.

"This is of concern to the Independent companies in that such schedules, if established in certain areas by the Bell companies, although not fundamentally sound, will affect the Independent companies in two ways:

"One way in which Independent companies will be affected will be in requiring a reduction of rate schedules for messages over Independent lines not warranted by operating conditions; and the other in lessening of revenues to the Independent company in the pro-rate portion of revenue to which it is entitled from receipts for joint haul business."

Mr. Wilder suggested the following solutions:

That the Independent group should support the Bell system in the establishment of a nation-wide toll system.

That the Independent group should confer with the Bell group and determine a sound position with regard to rate schedules, particularly for short-haul toll business.

That the Independent group, while pledging its support to the Bell companies in establishing its nation-wide toll system, should convey that it will expect that necessary repeater equipment for any of its member companies may be secured for Independently-owned toll lines on a basis of purchase or lease; in either case on reasonable terms.

Debate Tri-State Purchase at Board Meeting

The meeting of the board of directors of the United States Independent Telephone Association, which was held in two sessions during the convention, was the scene of a debate over the purchase of Tri-State Telephone & Telegraph Co. St. Paul property and certain of its toll lines by Northwestern Bell.

E. C. Blomeyer, executive vice-president of Theodore Gary & Co., holding company for Tri-State Telephone & Telegraph, explained his side of the case and repeated the reasons as to why the operating and economic conditions existing compelled the transfer to be made.

He stated that the cities of St. Paul and Minneapolis are so close together that they form one operating area which, within a short time, would require unified management. He pointed out that the traditional rivalry between the two cities is dying out, that the citizenships of St. Paul and Minneapolis were being rapidly merged, and that the opinion was held generally that one telephone service should be furnished both.

The 10-cent toll charge between the two cities would be abolished if the consolidation were made, and this would also meet with the approval of the public in both cities, Mr. Blomeyer said. Such a consolidation, he said, must be made within a short time and, therefore, economy and efficiency demanded that it be made as soon as possible.

In the discussion following Mr. Blomeyer's explanation, several directors advanced the idea that the Bell system should relinquish as many stations to the Independent group as it takes over at St. Paul. Mr. Blomeyer stated that the transfer contemplates the Northwestern Bell acquiring in the neighborhood of 70,000 stations in the St. Paul area, which would leave the Tri-State organization between 85,000 and 90,000. Director W. R. McCanne of Rochester, N. Y., believed the policy of relinquishments could be established in this case.

Director McCanne reminded the board that the Bell system has repeatedly said it desired two groups in the telephone industry, and that it wanted the Independent group to be strong. He indicated that this is a wise policy, because a strong Independent group is helpful to the Bell organization on many occasions.

Mr. McCanne said he believed the only way to maintain a strong Independent group is for the Bell, when it acquires Independent properties, to relinquish an equal number of stations. Thus, if the Bell system takes 70,000 stations in St. Paul, it should relinquish 70,000 stations to the Independents in some other territory.

The speaker said no efforts should be spared to prevent leaks in the Independent dam, which now holds some 4,500,000 stations, and he favored protesting against any enroachment on these holdings. Mr. McCanne said he feared the St. Paul sale would cause a rift in the Independent dam that might be very dangerous unless relinquishments were insisted upon.

The directors' meeting adjourned without taking any action on the proposed St. Paul transaction. No motion was made to dispose of it, and the matter accordingly is still in the hands of the executive committee.

MacKinnon Re-elected President

Mr. MacKinnon was re-elected president of the association, and Charles C. Deering of Des Moines, Ia., was re-elected treasurer at the board of directors' meeting. Vice-presidents elected were: Henry Barnhart of Rochester, Ind., Houck McHenry of Jefferson City, Mo., and W. G. Brorein of Tampa, Fla.

The following new directors were chosen: J. H. Agee, Lincoln, Neb.; W. L. Cook, Chicago; Fred B. MacKinnon, Chicago; Houck McHenry, Jefferson City, Mo.; George A. Yanochowski, Chicago; B. L. Fisher, Rocky Mount, Va.; J. F. Hayden, High Point, N. C.; J. L. Mathews, Statesboro, Ga.; H. A. Oberdorf, Columbia, Pa.; K. B. Schotte, Kittanning, Pa.; L. S. Gardner, Waco, Tex.; Henry A. Barnhart, Rochester, Ind.; Louis Pitcher, Dixon, Ill.; W. N. Winter, Everett, Wash.

Following his election, President MacKinnon named the following as members of the executive committee: W. R. McCanne, Rochester, N. Y.; George A. Yanochowski, Chicago; Frank A. Knapp, Bellevue, Ohio; E. C. Blomeyer, Chicago; George X. Cannon, Freeport, Ill., and J. H. Agee, Lincoln, Neb.

Geiger Gives Washington Report

Prosecution of tax cases occupied most of the attention of the association's Washington office during the past year, according to General Attorney Alfred L. Geiger who presented the Washington report at the convention.

"During the past year the Attorney General ruled that bills introduced by

Representative Louis Ludlow of Indiana to extend the counterfeit laws to forbid the use of slugs in coin-operated devices, would be unconstitutional if passed by Congress," Mr. Geiger said.

"Since the Attorney General's dicision Ludlow has introduced a new bill making it a misdemeanor in the District of Columbia to use slugs in coin-operated devices. This bill is not unconstitutional."

Report of Accounting Division

The report of the accounting division was read by Chairman A. C. Cragg, secretary-treasurer, Tri-State Telephone & Telegraph Co., St. Paul, Minn.

"We have kept constantly in touch with the progress made by the Interstate Commerce Commission on the depreciation order," he said, "and have, in conjunction with representatives of the Interstate Commerce Commission and the American Telephone & Telegraph Co., endeavored to so write the new accounting circular that it will harmonize with the depreciation order whenever it becomes effective.

United States Chamber of Commerce Report

The "Report of Councilor to the United States Chamber of Commerce" was given by E. D. Glandon, secretary, Pike County Telephone Co., Pittsfield, Ill.

"As a member of the United States Chamber of Commerce," Mr. Glandon said, "The United States Independent Telephone Association occupies an unusual position, due to the fact that it neither manufactures nor merchandises in the usual way, and, furthermore, that its rates are fixed by state and federal bodies.

"Each member organization is entitled to a councilor and one or more delegates according to its membership. The councilor is expected to be a connecting link between his organization and the national chamber."

Further Divisional Reports

The importance of good transmission was stressed by A. L. Stadermann, chief engineer, Citizens' Home Telephone Co., Terre Haute, Ind., and chairman of the plant division, who gave the annual report of his committee. He urged plant departments to improve transmission conditions where they are necessary to place the company on a proper basis for handling toll business.

"It is a fact, not generally known, that Independent telephone companies control approximately 25 per cent of the telephones of the country, with a capital investment running well over a half-billion dollars," said Roy F. Mapes, traffic superintendent, Jamestown Telephone Corp., Jamestown, N. Y., and chairman of the traffic division, in his annual report.

"In the past few years this important division of the nation's communication network has made great headway in offering adequate service to its subscribers.

"Improvements during 1930 have indicated a determination on the part of the Independent telephone companies to furnish telephone service on a par with the best to be had. The local and long distance operating practices recommended by the national association are being revised from time to time and kept up to date in order that all Independent telephone companies may have continually before them the latest and best methods known to the art."

The first annual report of the program service division was given by Chairman L. O. Painter, chief engineer, Program Service Co., of St. Paul, Minn., in the form of a history of this department.

At a separate meeting of this division held during the convention, George B. Quatman, vice-president, The Utilities Service Co., Lima, Ohio, in an address stated that the principal difference between radio and program service is that program service, as the name implies, brings into the home the best of the distributed programs, which have been selected by someone who has made a study of what is being broadcast, and supplements programs of a national interest with local programs.

Cooperation Between State Associations

A further exchange of information between state associations was advocated by A. J. Parsons, secretary-treasurer, Illinois Telephone Association, Springfield, Ill., at the meeting of executives of state telephone organizations held in connection with the national convention.

"An exchange of visits at our state conventions and district meetings would undoubtedly lead to a broader understanding of the most urgent problems of our industry, and should redound to the benefit of our membership. Undoubtedly a closer relationship would result in a greater benefit to the membership and industry as a whole."

Much the same sentiment was expressed at this gathering by W. H. Beck, secretary-treasurer, Indiana Telephone Association, Indianapolis, Ind., who stressed the value to the association of exchanging bulletins, news letters, and reports of studies, and other information.

Use of Standard Definitions

"Standardization does not mean the end of progress—it means a real freedom to progress by removing the hindrance to physical construction and mutual understanding," according to Dr. Arthur Bessey Smith, chief research engineer, Automatic Electric, Inc., in his report to the national convention on the progress made in two lines of standardization, symbols and abbreviations, and terms and definitions.

"The benefits of a common language are evident. But even our use of the words of daily life vary somewhat over large portions of country, and each of us has the tendency to stick to the old terms with which he is familiar.

"The association asks for your cooperation by suggestions and by beginning to use such few terms as may be new to you."

The concluding event of the convention was a joint luncheon Friday noon, October 17, with the Illinois Manufacturers' Association. Following the luncheon, Dr. Sergius P. Grace, assistant vice-president, Bell Telephone Laboratories, New York, N. Y., demonstrated some of the latest developments of the Bell laboratories.

Exhibitors

Exhibits in the exhibition hall of Stevens Hotel, shown throughout the duration of the national Independent convention, were the following:

Acme Card System Co., Chicago.
American Electric Co., Inc., Chicago.
Automatic Electric, Inc., Chicago.
W. M. Bashlin, Inc., Grove City, Pa.
L. M. Berry & Co., Dayton, Ohio.
Lynton T. Block & Co., St. Louis, Mo.
Bond Electric Corp., Jersey City, N. J.
Churchill Cabinet Co., Chicago.
Coffey System & Audit Co., Indianapolis, Ind.
Coffing Hoist Co., Danville, Ill.
Cook Electric Co., Chicago.
Curtin-Howe Corp., New York.
Do/More Chair Co., Elkhart, Ind.
The Ekko Co., Chicago.
Electric Storage Battery Co., Philadelphia, Pa.
Everhot Mfg. Co., Maywood, Ill.
Everstick Anchor Co., St. Louis, Mo.
Fansteel Products Co., Inc., North Chicago, Ill.
French Battery Co., Madison, Wis.
General Dry Batteries, Inc., Cleveland, Ohio.
The Holtzer-Cabot Electric Co., Chicago.
Highway Trailer Co., Edgerton, Wis.
J. K. Johnston, Indianapolis, Ind.
Joslyn Mfg. & Supply Co., Chicago.
James R. Kearney Corp., St. Louis, Mo.
The Kellogg Switchboard & Supply Co., Chicago.
Kester Solder Co., Chicago.
Leich Electric Co., Genoa, Ill.
National Carbon Co., New York.
National Fireproofing Corp., Pittsburgh, Pa.
Naugle Pole & Tie Co., Chicago.
North Electric Co., Galion, Ohio.
Page & Hill Co., Minneapolis, Minn.
Philadelphia Storage Battery Co., Philadelphia, Pa.
Quick Directory Co., Inc., Indianapolis, Ind.
Reliable Electric Co., Chicago.
John A. Roebling's Sons Co., Chicago.

(*Continued on page* 44.)

Functions of Trunk Circuit Relays

Operations of the Various Relays Are Here Differentiated in Detail by John H. Levis, Jr., Telephone Engineer, Rochester, New York, in the Fifth of His Series of Articles on Straightforward Trunking.

Inasmuch as this installment refers to the various relays of the trunk circuit proper and to the relays associated with the trunk circuit reference should be made to the circuit diagram of the complete straightforward "B" trunk circuit in the October issue of TELEPHONE ENGINEER. There are fourteen relays in the trunk circuit proper. The thirty-four relays associated with the trunk circuit are known as common relays. If forty trunks are obtained in a "B" position only one set of common relays are used for the control of the 40-trunk circuits. The thirty-four common relays do not include the common flash relays known as A, B, C and D shown in the circuit diagram.

Some of the common relays are subdivided into groups of twenty and are so marked in the circuit drawing. When taking these subdivisions into consideration there are more than thirty-four relays but, in describing and showing the circuit, statements will be based on thirty-four common relays.

It will be noted by the trunk circuit drawing that all of the common wiring from the common relay equipment to the trunk circuit proper is shown in broken lines and that it is shown terminated with a common terminal designation. Solid lines indicate connecting wires of a trunk circuit or the connections in the complete common circuits.

The following paragraphs, with the use of a diagram of relay symbols, will explain the functions of each relay in the trunk circuit proper and each will be referred to numerically.

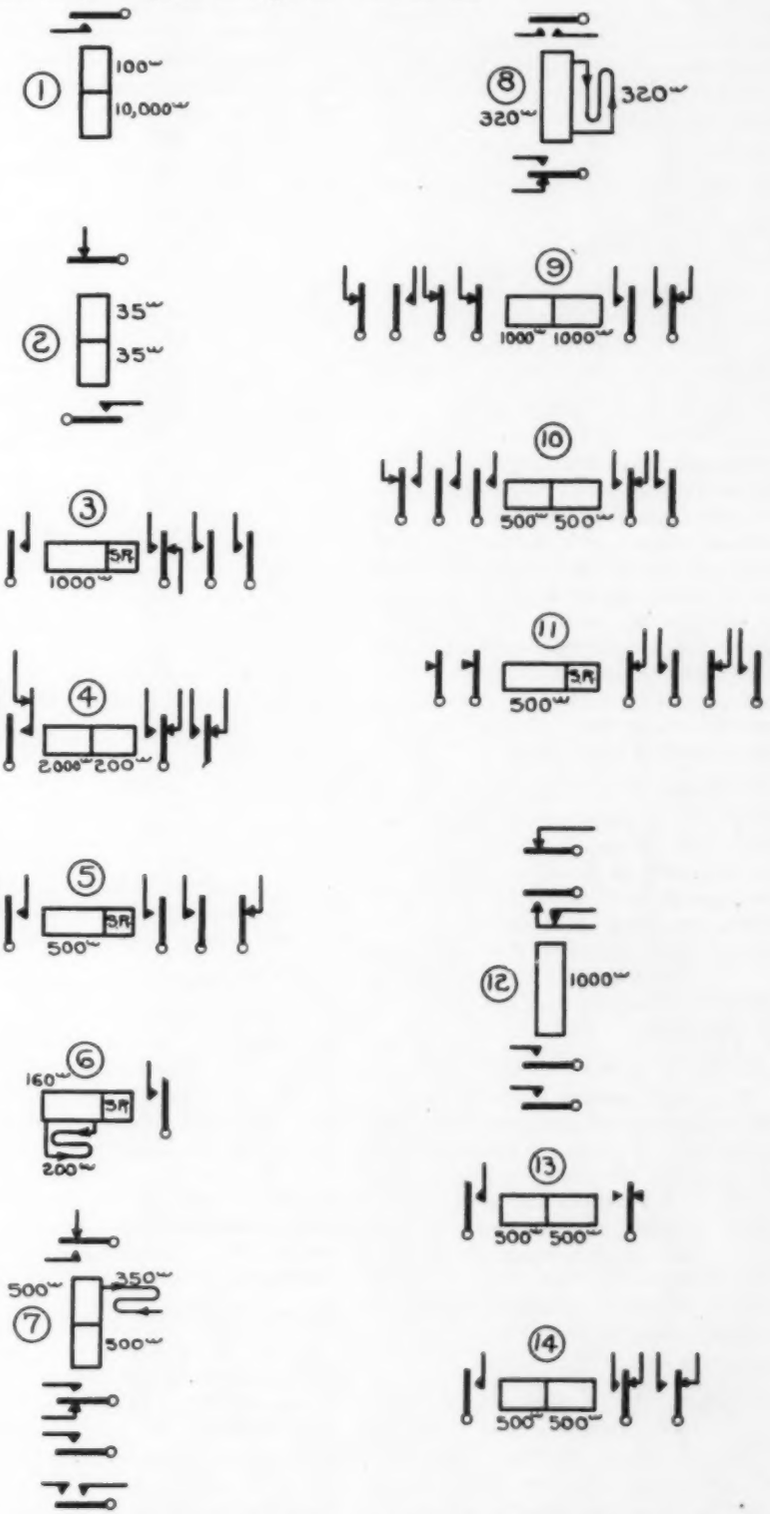
The diagram published with this installment shows the relays of the trunk circuit proper, giving them their position in the circuit according to number location and direct current resistance values. They also are shown in the same position as in the drawing of the complete circuit. The common relay functions will be explained in the December issue of TELEPHONE ENGINEER.

(1) *Hi-Lo Resistance Incoming Control Relay.*

This relay operates from the distant "A" office cord circuit battery on Hi resistance and Lo resistance windings in series. The cord relays at the distant office non-operate, when the relay operates the cord lamps are lighted.

(2) *Station Battery Supply Relay.*

This relay operates through the station loop. It controls the supervision at distant "A" office cord circuit and shorts out the Hi winding, causing the distant office cord relays to operate through the Lo winding. It also opens the lockup winding of the operator's cut-in relay number ten.



Relay symbols of straightforward trunk circuit and direct current resistance values

(3) *Main Circuit Control Relay.*

This relay operates from the number one relay. It is of a multi-contact type and is slow to release. It reduces the possibility of a momentary opening of the control circuits causing an unnecessary "A" recall. It also keeps number one relay from fluttering when an "A" operator, at times, rings on the trunks.

The operation of this relay closes the lockup winding of relay number ten, closes the circuit for steady trunk lamp when the advance traffic key is operated, lights the trunk lamp when the "A" office disconnects, provides holding ground circuit for relay number twelve and furnishes start circuit for the operation of sequence control of relay number four.

(4) *Operator's Sequence Cut-in Control Relay.*

This relay closes the circuit from the common equipment to the operator's cut-in relay number ten. The contacts of the number four relay are in multiple series, so arranged that proper sequence of the operator cut-in is maintained.

(5) *Common Key Equipment Cut-in Relay.*

Operates from number ten relay (the operator cut-in relay). This relay is of the slow release type in order that the various relays will function properly. The relay opens the ringing generator circuit from plug when a call has come in while the plug is in a line and a preselect of ringing is made. This prevents the ringing of the station bell. It also controls the operation of the ringing selection relays Nos. 7, 13 and 14 and the release control relay No. 9.

(6) *Ringing Trip Relay.*

Operates in series with the station loop when the circuit is closed. It nonoperates with the proper time element on the ringing load and when the loop is closed the proper time element or contact closing is maintained to release relay No. 7. The relay also cuts the ringing generator from the loop and closes the talking circuit.

(7) *Ringing Control Relay.*

This relay operates from the common key equipment and applies ringing to the station bell. It closes the monotone audible ringing to the trunk for ringing indication to the calling station at distant office through relays numbers ten and eleven, controls the opening of the talking conductors while ringing and controls holding of relays numbers thirteen and fourteen while ringing.

(8) *Cord Sleeve Relay.*

Operates when a trunk plug is placed in any jack through the jack sleeve resistance or line cut-off relay. Relay number eleven operates from this relay. It controls the circuit for recall from the intercepting desk and also controls the trunk lamp circuit. This relay has a noninductive winding around the inductive winding to prevent electrical shocks to the "B" operator (see installment explaining "A" office cord circuit).

(9) *Release Control Relay.*

Operates when any common key is operated except when a plug is in a jack. With the exception of the non-ring or re-establishing key this feature is necessary in cases of accidental momentary disconnect at the "A" office end. This relay controls the release of the sequence cut-in relay number four, causes the trunk lamp to light steadily and causes the locking winding to hold same after operated. The relay also is the circuit for operation of the busy tone relay control number twelve.

(10) *Operator's Cut-in Relay.*

This relay places the operator's talking circuit across the trunk, closes the flash circuit to the trunk lamp, indicating to the operator the trunk cut-in, operates the circuit for peg count, closes the circuit for operation of relay number five and closes the circuit for the lockup winding when the emergency key cut-in is used.

(11) *Main Cord Sleeve Control Relay.*

This relay operates from the relay number eight and being of the multicontact type it is slow to release. (Will be explained in a later installment.) It cuts the common busy test circuit from the tip of the plug and closes tip talking and ringing circuit through, closes audible ringing signal circuit, opens the common ringing key start wire to relay number nine (described under relay number nine), places ringing generator to ring of trunk plug through relay number twelve so it cannot be operated while the plug is in a jack and it provides for first locking circuit from relay number nine to relay number three.

(12) *Reverting Busy Tone Relay.*

This realy operates from the common key equipment. It places the busy tone signal to the distant station when a line is busy and causes the trunk lamp to go out. The relay remains operated until the cord at the distant office is removed from the trunk jack, releasing relay number one and associated relays. The "B" operator is also released from the trunk circuit, due to the release control relay number nine operating at the same time.

(13 and 14) *Ringing Frequency Selecting Relays.*

These relays operate from the common ringing key equipment and lockup, after being operated, on a locking winding. When relay number thirteen is operated and relay number fourteen is normal, a 66-cycle selection is made. When both thirteen and fourteen are normal a 33-cycle selection is made. When fourteen is operated and thirteen is normal a 50-cycle selection is made. When relays thirteen and fourteen are operated, a 16-cycle selection is made.

These combinations give the complete selection of four harmonic ringing frequencies. The circuit for these frequencies pass through relays described in other relay functions.

These two relays release when the called subscriber answers or a trunk is abandoned from the "A" end. This feature is used to conserve battery energy.

Book Review

Telephone Theory and Practice, the first of a three-volume series designed as a comprehensive manual for the student and reference work for the advanced telephone worker, written by Kempster B. Miller, consulting engineer. 515 pages, 6x9, 294 illustrations, $5.00.

Thirty years ago Kempster B. Miller wrote "American Telephone Practice," one of the early telephone manuals written in a non-technical language. Twenty-six years ago the book was revised and published under the same title.

The recent book by Mr. Miller, "Telephone Theory and Practice," is the result of an intention to again revise his earlier volume and bring it up to date. However, he discovered that since the last revision of his book the telephone art had changed so radically and the industry had expanded so tremendously that to write about it, or even think about it, in the old terms seemed inappropriate.

As a result the new work is published under a new title. It relates principally to underlying theory and attempts to lay a general groundwork for the more detailed discussion of telephone exchange systems, lines, systems of transmission and other subjects to be dealt with in succeeding volumes.

NATIONAL CHAMBER REPORTS INCREASE IN TELEPHONES

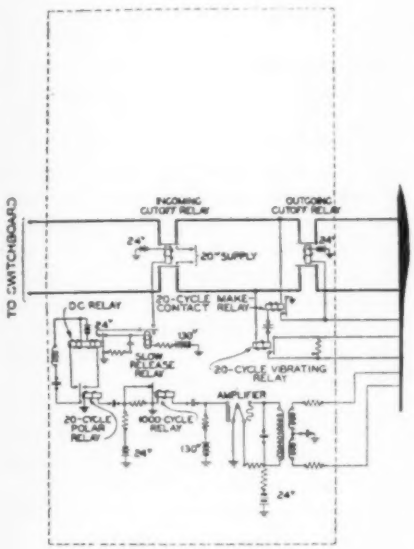
Growth in new telephone installations was reported as interrupted during the summer but has resumed in September. Current reports indicate that the volume of long-distance business in September will equal the volume in the month of September, 1929.

Construction expenditures by the Bell System during August were nearly equal to those for August, 1929, and during the first eight months of 1930 they were 10 per cent in excess of the first eight months, 1929.—United States Chamber of Commerce.

Solutions to Telephone Signaling Problems

In This Article, the Third of a Series by F. J. Dommerque, Fellow A.I.E.E., the Author Gives a Detailed Account of the Carrier Current Signaling System, and Tells How It Can Be Used Most Successfully.

The paper on "Carrier Telephone System for Short Toll Circuits" by Black, Almquist and Ilgenfritz, printed in the July, 1929, number of the TELEPHONE ENGINEER, gave a rather short account of the signaling system used in the type D carrier system. Moreover, the diagram pertaining to the signaling unit was



SIGNALING UNIT
20-CYCLE-1000-CYCLE RINGER
EMPLOYING SENSITIVE 1000-CYCLE RELAY

Fig. 1—Signaling unit of Type D carrier system

printed on such a small scale that its reading was difficult. Therefore, it seems opportune not only to present a larger scale diagram of this signaling unit but also to furnish a more complete description, as given by the authors of above paper elsewhere.

To start with, it may be mentioned that the usual 20-cycle ringing current as used for ringing subscribers in local exchanges can be employed also for signaling on short toll lines, as long as they are not used for telegraph and repeater service. To provide signaling possibility over toll lines with superposed telegraph and over repeater lines, a higher frequency has been found necessary, and a signaling system with 135-cycle ringdown operated by a make-contact 135-cycle relay was introduced. To employ this system on toll cables the signaling current had to be held down to a few milliamperes so as not to interfere with the direct-current telegraph systems on such cables. The employment of the 135-cycle relays involved relaying the signals at each repeater station, and in general, frequencies in the range below the voice frequencies could not be transmitted very efficiently. It was found that when it came to signaling on long-distance and carrier lines it was more advantageous to choose a frequency which was inside the range of voice frequencies, as thereby not only the relaying at intermediate points could be avoided but also interference could be made negligibly small. The 1,000 cycle current was selected for this voice-frequency signaling. A 1,000 cycle ringer is connected to the toll circuit at each terminal and the 1,000 cycle ringing current is sent over the carrier channel.

Type D Signaling Unit

In Fig. 1, which is an enlargement of the signaling unit shown in the schematic or terminal of basic type D system (Fig. 3 page 58 of the July, 1929 TELEPHONE ENGINEER) a 20-cycle make-contact relay is bridged across the carrier channel coming from the switchboard at the sanding end and connected in series with a condenser and a 20-cycle vibrating relay. The 20-cycle make-contact relay is operated by the 20-cycle ringing current from the switchboard. Its operation actuates the outgoing cut-off relay and a relay in the modulator circuit.

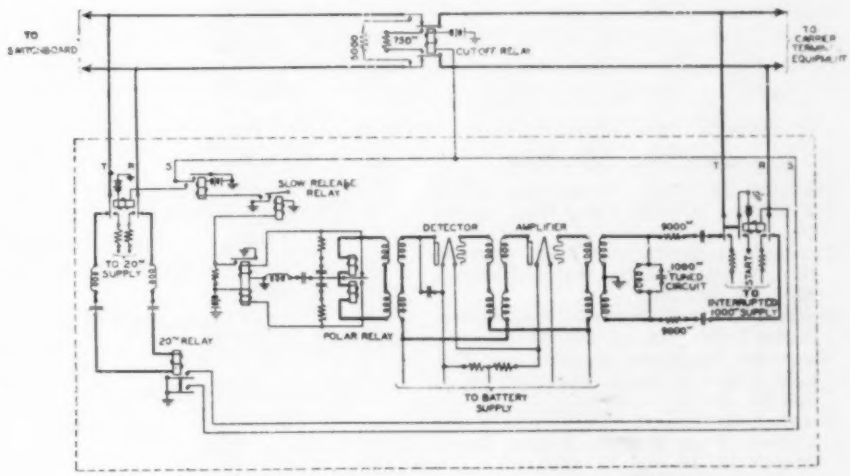


Fig. 2—Signaling unit of Type C carrier system

We know that this modulator is self-oscillating, that is, the carrier is produced by causing the two modulator tubes to oscillate in parallel, the frequency oscillation being controlled by the tuned circuit which couples the grid and plate circuit of the tubes. The action of the relay connects an auxiliary condenser to the tuned circuit and thereby lowers the frequency of the carrier oscillation by 1,000 cycles and at the same time opens the battery supply circuit for the plate of one of the tubes, thus unbalancing the modulator so that the carrier current is freely transmitted in the line.

The 20-cycle vibrating relay in series with the 20-cycle make-contact relay serves the purpose to short-circuit the output of the modulator 20 times a second, causing a modified carried current to flow over the line at a rate of 20 cycles per second.

To trace the signal circuit coming in at the distant end we use the same signaling unit diagram for our discussion. We notice an amplifier bridged across the demodulator output at the right of the hybrid coil (in Fig. 3 of the July, 1929, TELEPHONE ENGINEER) by means of a transformer. The carrier current of 1,000 cycles interrupted at the 20-cycle rate coming from the demodulator is amplified in this amplifier and used to operate a 1,000-cycle relay.

The armature of this relay vibrates at a 1,000-cycle rate during the periods of about one-fortieth of a second that 1,000-cycle current is applied, and is at rest during the periods of the same length of time that no current is applied. Thus the armature contacts open and close at a 20-cycle rate. In unison with the opening and closing of these contacts operates a 20-cycle polar relay controlled in its action by the armature of the 1,000-cycle relay. The polar relay again controls the operation of a direct-current relay provided with two windings, the

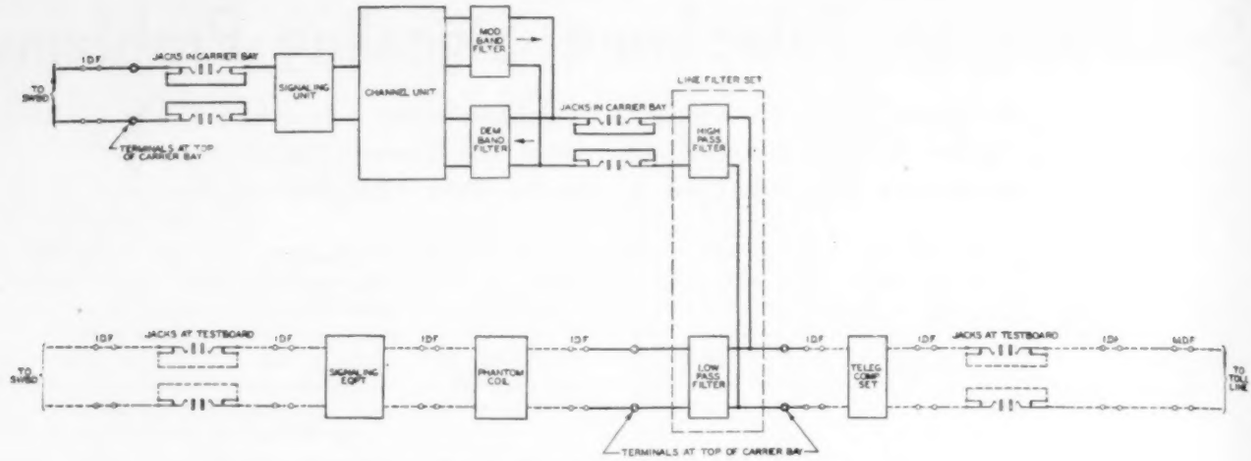


Fig. 3—Schematic of terminal of basic Type D system

one of which forms part of a 20-cycle tuned circuit consisting of an inductance coil and a condenser. This condenser alternately charges through this winding and discharges through the other winding in unison with the vibrations of the polar relay. The tuning of the 20-cycle circuit is sufficiently sharp so that the direct current relay will not operate if the armature of the polar relay deviates a few cycles from the 20-cycle rate.

The operation of the direct-current relay closes a circuit through a slow-release relay which controls the time during which the direct current relay causes current to be sent to the switchboard, where it operates a relay which causes a visual signal to be given to the operator. This interval of time, during which the delay takes effect, is approximately three-quarters of a second. It must be kept in mind that the signaling system we are speaking of is intended for and used by the operators to signal each other.

Type C Signaling Unit

In Fig. 2 the signaling unit used in the type C carrier system is given. This unit is essentially the same as the unit for the type D system, the principal difference consisting in the circumstance that the ringing current supply is obtained from a 1,000-cycle generator or vacuum tube oscillator, the type D carrier system not being provided with a self-oscillating modulator. On the hand of the method of operation of type D signaling unit described above it will be easy to trace the method of operation of the type C signaling unit.

Terminal Arrangement of Type D System

Fig. 3 illustrates schematically how the principal equipment units of the type D system, including besides the signaling unit also the channel unit, modulator band filter unit, demodulator band filter unit and line filter set are arranged and connected to the toll line. The diagram shows also the jack equipment provided for testing and patching and their location. The apparatus for each of these units is assembled on a panel. These panels are mounted on a rack and wired together, the leads which go to points outside of the bay being wired to a terminal block at the top of the rack. From this terminal block wires lead to the intermediate distributing frame IDF, where the connections to the toll line on the one hand and to the switchboard on the other hand are made.

A. T. & T. in New York State alone has decided to spend $12,951,325 more this year, making new construction in New York State for 1930 total $80,689,760.

OHM-IGOSH

Shock: "Do you like electricity?"

Absorber: "Naw, it makes me ohm-sick."—West Point Pointer.

Convention Schedule

Missouri Telephone Association, Hotel President, Kansas City, Nov. 18 and 19.

Canadian Independent Telo. Association, Prince George Hotel, Toronto, Nov. 25 and 26.

South Dakota Telephone Association, Sioux Falls, Jan. 13, 14 and 15, 1931.

Nebraska Telephone Association, Lincoln Hotel, Lincoln, February 10, 11 and 12, 1931.

Texas Independent. Telephone Association, Fort Worth, Texas Hotel, March 17, 18 and 19, 1931.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, April 7, 8 and 9, 1931.

Pennsylvania State Telephone & Traffic Association, Hotel Penn Harris, Harrisburg, May 26, 27, and 28, 1931.

IMPROMPTU SPEECHES CHARACTERIZE ANNUAL MEETING OF INDEPENDENT PIONEERS

Old friendships were renewed and new ones begun at the annual business meeting of the Independent Pioneers' Telephone Association of the United States, held Thursday morning, October 16, at the Hotel Stevens, Chicago, in connection with the annual Independent national telephone convention.

The Pioneers have annexed 97 new members during the last year, according to J. K. Johnston, secretary-treasurer of this organization of telephone men who must have seen fifteen years of service in the telephone field before they are eligible to membership. Secretary Johnston said the organization has a total membership of 1,033.

Impromptu addresses were given by President George X. Cannon of Freeport, Ill., Judge N. G. Hunter of Wabash, Ind., a leader in the Independent movement for more than thirty-five years, Henry A. Barnhart of Rochester, N. Y., and J. G. Ihmsen of Albany, N. Y., president of the Up-State New York Telephone Association.

Mr. Barnhart referred to the era of mad speculation which ran rife in the country last year, and reminded his hearers that buyers in the telephone field had undoubtedly paid prices for plants twenty years old that could not be justified in actual operation. He expressed fear that this might adversely effect telephone operators in the business to stay.

As an experienced politician and ex-congressman, Barnhart warned his fellow-members of the Pioneers not to believe political speakers who indicate that prosperity depends on the success of any one political party. "Prosperity depends on the state of mind of the people," he said, "which right now is undergoing a reaction from the spending era of 1929."

Frank L. McKinney of Ohio was chosen president of the Pioneers, and J. K. Johnston, Indianapolis, Ind., was elected secretary-treasurer.

The annual luncheon of the Independent Pioneers, held at the Stevens Hotel immediately following the business meet-

(*Continued on page 32.*)

Comparative Transmission Tests

Practical Methods of Testing the Efficiency of Subsets, Transmitters, and Receivers, Are Here Presented by B. C. Burden, Transmission Engineer, Lincoln Telephone and Telegraph Co., Lincoln, Nebr.

In addition to establishing standard transmission limits, the standard reference system is used as a reference base for expressing instrument efficiency. The transmitting and receiving elements of the standard reference subsets are arbitrarily regarded as having zero loss. Now if a different type of receiver, transmitter or complete subset is used to replace the standard subset, then the amount of loss in DB's which would need to be cut out or inserted in the reference circuit adjustable line so that the voice level under the test condition would be the same as that under the standard condition, represents the loss or gain in DB's of the equipment under test as compared to the standard equipment.

For example, if we found it necessary to cut out 1 DB loss to obtain standard volume when a new type receiver is substituted for the standard receiver at the listening end, then we would say that the receiver under test is 1 DB poorer than the standard receiver.

In considering the "voice levels" at any point in a telephone connection we can again use the standard reference system as a base. As an example, suppose we say that the magnitude of the voice level entering a repeater shall not be more than 25 DB, we mean that the energy at 25 DB should be the same as that which would be heard in the receiver of one of reference subsets with 25 DB cut in the artificial line and with someone talking in the other subset transmitter in normal tone.

By reference to the standard circuit the DB thus acquires, in a sense, a definite value.

A new standard reference system has been developed by the Bell System to replace the old one which was also designed by the Bell System. (See Bell System Technical Journal, 1929.) The new system does not materially differ from the old one in the values it expresses; it is, however, much more elaborate and unlike the old one is distortionless. Much credit is due the Bell System for the establishment of transmission reference systems and the suitable units by which telephone transmission may be measured.

Practical Application of the DB

In considering the volume of transmission that will take place over a given connection, it is necessary to have curves that will show the efficiency of the transmitting and receiving elements for varying lengths of a given type cable or open wire. These curves take into account the transmitter current loss (C. B. lines) which varies with the resistance between the central office and subset, and the high frequency loss which depends upon the type of facility and length. Because of the difference in efficiency of various types and makes of subsets, as well as the transmitter supply loss, the direct addition of all the high frequency losses in a connection will only give an approximate idea of the actual overall loss. In most cases the actual overall loss in DB's will be several DB higher than the sum of the high frequency losses in the connection.

Some of the telephone manufacturers have prepared curves for their subsets covering the various facilities that might be used.

If curves can be obtained from the manufacturer whose instruments are being used the procedure in studying an overall connection consists in obtaining from the curves the transmitting and receiving losses and to this adding the central office equipment loss, or if the connection is between subscribers in two offices, the transmitting and receiving losses on the two loops, plus the office loss in each office, plus the high frequency loss in the connecting trunk are added together to get the overall loss. In taking the transmitting and receiving losses, the transmitting loss should be taken for the loop having the highest loss.

In small single office exchanges 24 gauge cable (city) can generally be used for all subscribers' loops. However, in contemplating subscribers' loops longer than 1½ miles it is a good practice to consult the transmission engineers of the toll connecting company to make sure the loop loss is not high enough to result in poor toll connections.

The following table lists transmission losses of cable, open wire, and approximate losses of central offices and repeating coils.

The cable losses given are reasonably close to actual values; however, the loss for cable will vary, depending upon whether it is loose or tight core.

Transmission Losses

Facility	Loss per Loop Mile (DB's)
No. 24 ga. cable	2.05
No. 22 ga. cable	1.71
No. 19 ga. cable	1.25
No. 14 (.083) iron	.37
No. 12 (.109) iron	.30
No. 14 (.081) Copperweld	.24
No. 12 (.102) Copperweld	.17
No. 10 (.128) Copperweld	.12
No. 12 (.104) copper	.068

Repeating coils old type (2 to 4 DB). New type (.5 to 1.25). Central Office loss—approximately 1 DB for small offices.

"Telephone transmission" is the finished product which the subscriber's monthly rental purchases. The subscriber is undoubtedly conscious of the central office, poles, cables, wire, etc., which unite to provide the channel over which his voice will pass, but it is certain that he will not commend or condemn the company because of small imperfections in these units.

But what about transmission? Is it not here that he will sit in judgment on the company furnishing him with service?

I think it is safe to say that "transmission" is the most important single consideration in the operation of a telephone system.

It is, of course, true that neat appearing central office buildings, well built outside plant, or courteous employees impress a subscriber favorably, but the impression is not lasting if the transmission is of the "hoop and holler" variety.

Transmission Factors

The grade of transmission which can be given on a telephone exchange will depend upon four principal factors, which are:

1. The loss in the subscriber's loop and the central office cord circuit.
2. The receiving and transmitting efficiency of the subscriber's telephone.
3. The manner in which the subscriber uses his telephone.
4. The loss in trunk plant when talking to another office either in the same city, or on toll.

Loop Losses

Let us consider each of the above factors in the order given: Loop loss will depend upon the inherent loss in the type of plant used plus any additional loss introduced by inadequate or improper maintenance. On common battery loops the loss consists of two items, viz.: high frequency loss, and the loss due to the drop in voltage of the current suply as a result of the ohmic resistance of the loop.

In most single unit exchanges it is practicable from a transmission stand-

point to use 24 gauge cable on all loops except rural. The loss on rural loops should be kept as low as possible by keeping the cable portion of these circuits at a minimum. The present practice of using No. 12 (.109) iron wire for rural loops will need to be changed to No. 12 (.104) copper if farmers are to be provided with a grade of transmission approaching that given to town subscribers. Some companies have already adopted the practice of using copper on their longer rural loops. The importance from a revenue standpoint of encouraging the use of tool by the rural subscriber should tend to hasten the use of copper for rural circuits. The approximate cost for placing a circuit mile of iron and copper is $35.00 and $75.00, respectively.

Transmission Loss Due to Eavesdropping on Multi-Party Lines

Even with copper line wires the transmission on multi-party rural circuits may be much poorer than the desired standards because of loss due to eavesdropping subscribers.

The magnitude of the loss caused by "listening in" is not generally appreciated. Actual tests made on a line having 8 bridged subscribers show that the amount of energy reaching the called party's receiver, with a variable number of receivers off the hook, varies as follows:

Number of eavesdropping receivers off the hook.	Relative amount of energy reaching called subscriber.
0	100%
1	50%
2	25%
3	12%
4	6%

Fig. 1—Loss caused by eavesdropping on multi-party lines.

Unfortunately, at the present time there is no method by which eavesdropping loss can be avoided. Some slight reduction is provided by "transmitter hook latch" arrangements which keep the transmitter circuit open when a subscriber is listening in on someone else's conversation. However, the slight gain in transmission with such an arrangement is generally more than offset by the encouragement such a device gives to the practice of "listening in."

The best remedy for the large loss set up by "listening in" is to educate the subscriber to the fact that he is seriously impairing his neighbor's conversation when he follows this practice, and that it is especially objectionable on toll calls.

Transmission Loss in Central Office Equipment

The transmission loss in central office equipment depends upon the nature of the equipment which is in series and bridged across the talking circuit. In modern boards this loss is small and for the small and medium sized boards should seldom exceed 1 DB. On some of the older boards this overall loss is somewhat higher due to "high loss" repeating coils and other factors.

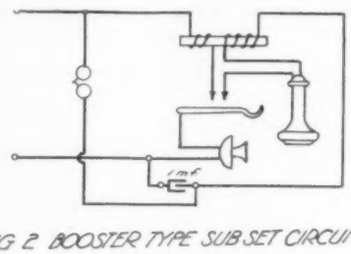


FIG 2 BOOSTER TYPE SUB SET CIRCUIT (COMMON BATTERY)

It often happens that a wiring error, in switchboard cord circuits, made at the time of installation, may reverse the connection to a repeating coil or relay and introduce a large loss which while not affecting the supervision will greatly impair transmission on such a cord. This type of trouble can readily be located by means of transmission tests on all of the cord circuits.

Transmission Efficiency of Subsets

The efficiency of subscribers' sets play a very important part in the grade of transmission rendered by a telephone exchange. The efficiency of a subset is largely determined by the merit of the receiving and transmitting elements and to some extent on the type of circuit employed. All magneto (both old and new) telephones have about the same talking and receiving circuit. However, common battery sets with various types of talking circuits have been put out by the manufacturers supplying telephone equipment. Some of the circuits originally used are much poorer than present day circuits and instruments of this type should be used only on the shortest loops, and never installed for subscribers who are heavy toll users.

The most efficient type of common battery transmission circuit in use today is the "booster type." See figure 2. This circuit has a much higher efficiency than any of the circuits shown in figure 3, because of the boosting action of the condenser which discharges and charges through the secondary winding of the induction coil with changes in transmitter resistance. This charging and discharging action results in an increased change in the current fluctuations in the primary, thus "boosting" the fluctuations that would normally take place. Practically all common battery sets are now being furnished with this type circuit.

Present day receivers and transmitters are much more efficient than those manufactured some years ago, yet there are undoubtedly many more of the old type than the new in service today. A wholesale replacement of low efficiency transmitter or receivers is obviously impracticable; however, considerable thought should be given to the ultimate elimination of such equipment as cannot be relied on to give a good grade of transmission. The subscribers on long, heavily loaded rural lines should be the first to receive transmission betterment by the replacement of inefficient transmitters and receivers. Transmission tests will readily determine the relative efficiency of the old type elements as compared to the new type. Differences as high as 6 DB are often found and differences of from 2 to 4 DB very common. (These tests are described later in this article.)

Transmission Losses Due to Improper Use of Instrument

In running down transmission complaints on toll calls it is often found that the trouble is due to improper use of the telephone by the subscriber. A considerable loss is introduced by the subscriber not talking directly into the mouthpiece with the lips approximately one-half inch away from the outer edge. Comparative tests have established that the loss in transmission due to the talker having his lips 2½ inches away from the transmitter instead of the specified standard is approximately 6 DB. In other words, the energy at the distant receiver would be only 25% as great as it would were the talker only one-half inch from the mouthpiece.

Subscribers should also be cautioned not to hold the transmitter (desk sets)

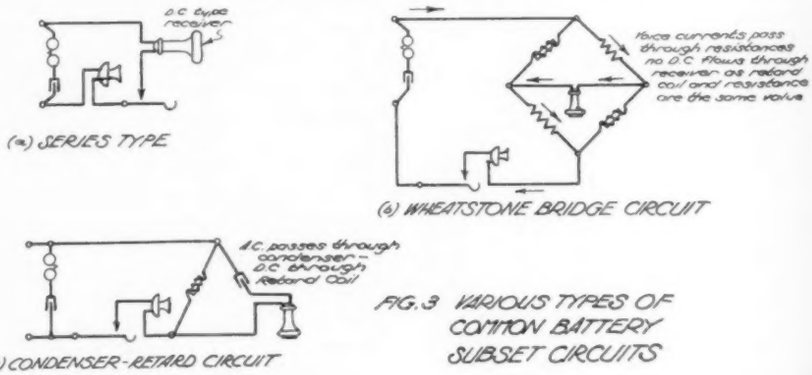

D.C. type receiver
(a) SERIES TYPE
Voice currents pass through resistances no D.C. flows through receiver as retard coil and resistance are the same value
(b) WHEATSTONE BRIDGE CIRCUIT
A.C. passes through condenser — D.C. through Retard Coil
(c) CONDENSER-RETARD CIRCUIT

FIG. 3 VARIOUS TYPES OF COMMON BATTERY SUBSET CIRCUITS

in a horizontal position as this interferes with good transmission. The design of hand sets is such as to almost force people to talk directly into the transmitter, hence should result in better and more uniform transmission from these instruments.

Transmission Losses in Trunk Plant

The loss in trunk plant, i. e., the cables connecting central offices in the same city, or the toll lines connecting offices in different towns, must be kept sufficiently low, so that on any overall connection the total transmitting and receiving losses in the two subscribers' loops plus the central office losses, plus the trunk plant; especially is this true of the iron tributary circuits which in the past have constituted the weak link in an otherwise perfect chain.

Iron wire in addition to having 4.3 times the loss of copper wire (No. 12) also has the advantage of increasing loss with age, due to corrosion.

Transmission Testing Circuits for Determining Instrument Efficiency

In the previous paragraphs we discussed the various factors that affect the grade of transmission that can be rendered. Let us now consider methods and equipment by means of which we can test the transmission we are giving.

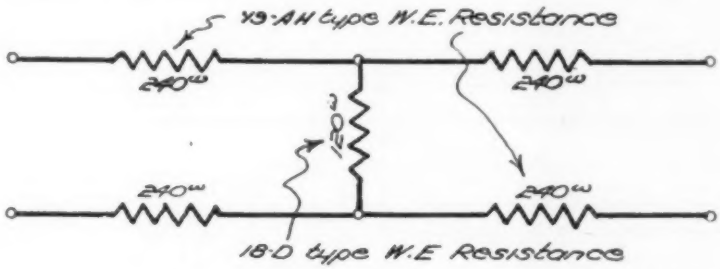


FIG 4 - 20 DB TRANSMISSION TESTING PAD

loss, will not be greater than the established standards of 20 DB for local, and 30 DB for toll.

Practically all important toll lines are constructed of No. 12 (.104) copper. In the past No. 12 (.109) iron has been used to some extent for short and relatively unimportant toll lines, and also for connecting tributary offices to their toll centers. The present practice is, however, toward a complete copper toll

Transmission tests and measurements can be divided into three general classes, viz.:

1. Talking and listening tests on subscribers' loops in which the overall equipment of the circuit under test is increased to approximately 30 DB by means of a resistance network.

2. Bench tests on subscribers' sets to determine the loss or gain in DB's of the set under test as compared to a standard set, also similar tests of transmitters and receivers against standard elements.

3. Transmission measurements on trunk circuits, central office cords, etc., using either a regular Western Electric (Graybar) transmission measuring set or a calibrated variable attenuator.

A very satisfactory method of locating transmission faults in subscribers' loops and subsets is by means of talking tests through a high loss pad. For example, a subscriber may complain of poor transmission on a toll call. The wire chief in running down the complaint makes talking tests with the subset reported in trouble and the conversation seems satisfactory, yet a 6 DB fault may be present in the subscriber's loop which for purposes of illustration we will assume has a normal transmitting loss of 9 DB. The wire chief will ordinarily not observe the transmission impairment due to the 6 DB fault as the ear is not sensitive to changes in volume when the overall equivalent in DB'S are low. However, if the overall equivalents of a circuit are relatively high the ear will readily detect small changes in volume due to transmission faults. Now suppose in the above case we connect in the wire chief's circuit a 20 DB pad (see figure 4). The total circuit equivalents will now be increased to $9+6+20$ or 35 DB and the wire chief should be able to detect the fault, whereas in the first instance with overall equivalents of $9+6$ or 15 DB he probably would not.

Most of the large local test boards are equipped with transmission testing pads, but for some unknown reason this

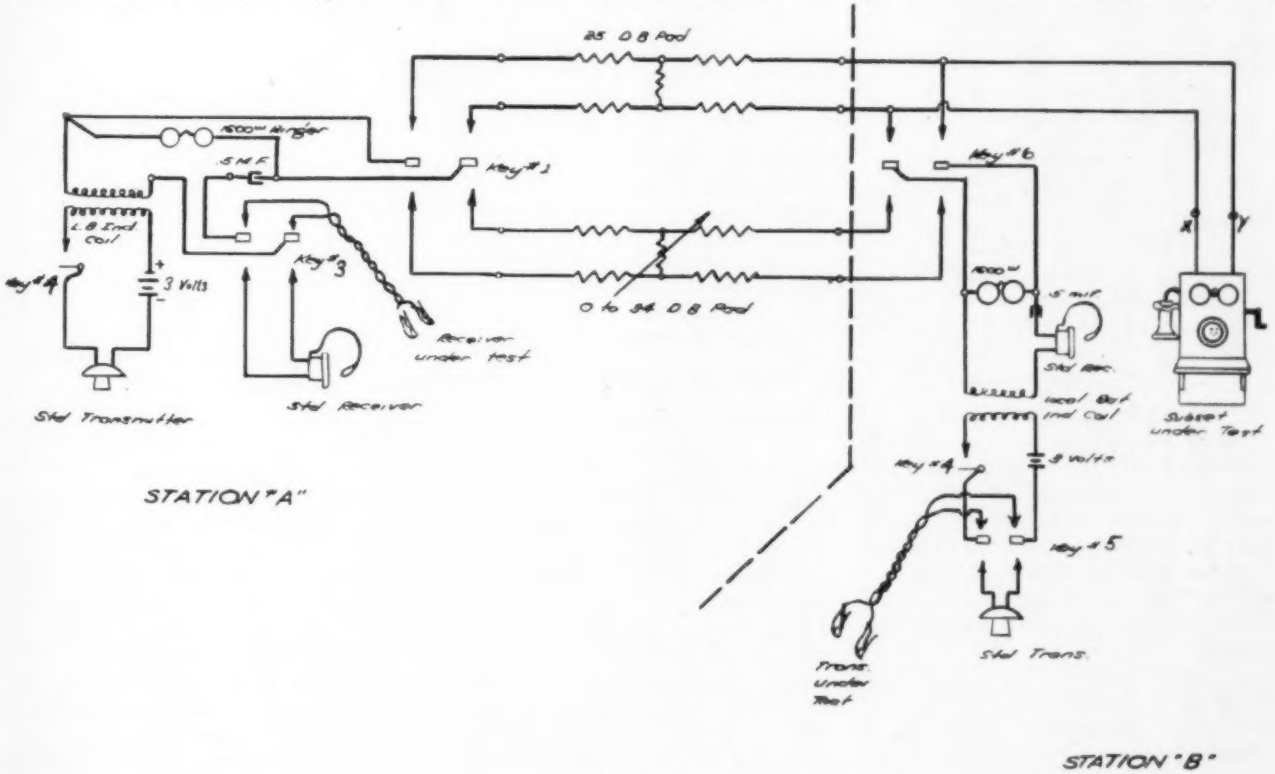


Fig. 5—Transmission testing circuit for subsets, transmitters, receivers. (Local battery)

feature has never been furnished with the smaller test cabinets in use by the small magneto and common battery offices. These pads may be easily wired into existing test board circuits as shown in an article in the July issue of Telephone Engineer, entitled "Testboard Theory and Practice."

No exchange can afford to be without this testing feature, as many cases of subsets and circuits having excessive losses can be picked up, which without it would be passed up unnoticed.

Suitable resistances for a 20 DB and can be obtained from the Graybar Electric Co., asking for two 19-AH and one 18-D type resistances.

ume the overall equivalent of the testing circuit is increased to 25 DB by means of a resistance pad.

Figures 5 and 6 illustrate circuits suitable for making transmission tests on subset, transmitters, and receivers.

Essentially the circuits consist of two standard subsets, a 25 DB fixed resistance pad, a variable 0 to 34 DB pad, and an arrangement of keys for switching the various elements to the proper position for testing.

In setting up the testing circuits shown it is essential that the equipment indicated inside the dotted squares be located in separate rooms, or in adjacent soundproof booths, so that the listening observer cannot hear the talker.

The transmitter of standard set at Station B, as well as the transmitter under test, should be connected to the circuit by means of flexible leads to permit holding the transmitters in various positions so as to detect abnormal frying, packing, etc.

The standard circuits and switching keys can best be made up from the necessary parts mounted on a bakelite or hard rubber panel fastened to the test table by means of brass or steel angles. Cam keys should be used in preference to double pole-double throw knife switches as they permit a more rapid throw from one circuit to another.

The two milliammeters shown in the common battery testing circuits can be obtained from the Weston Electrical Instrument Corporation, Newark, N. J., by ordering as follows: Model 301—0 to 200 milliampere range.

These milliammeters measure the current taken by the transmitter under test and that of the standard transmitter. The current should be adjusted to a value which would correspond to that taken by a similar type transmitter on an average length loop. This adjustment can be made by connecting several dry cells in the battery feed wires so as to either act as series aiding or counter e.m.f. cells, depending on the desired current value. Another method of adjusting the current value would be to connect a variable radio resistor in series with the battery feed wires. By arranging to vary the current taken by the standard and test transmitter, it is thus possible to compare the two transmitters under various current supply conditions. Some transmitters are much more efficient than others on long loops, even though the efficiency may be the same on the shorter loops.

The variable pad shown is constructed of six resistance net works and six cam type keys. The photograph shows two

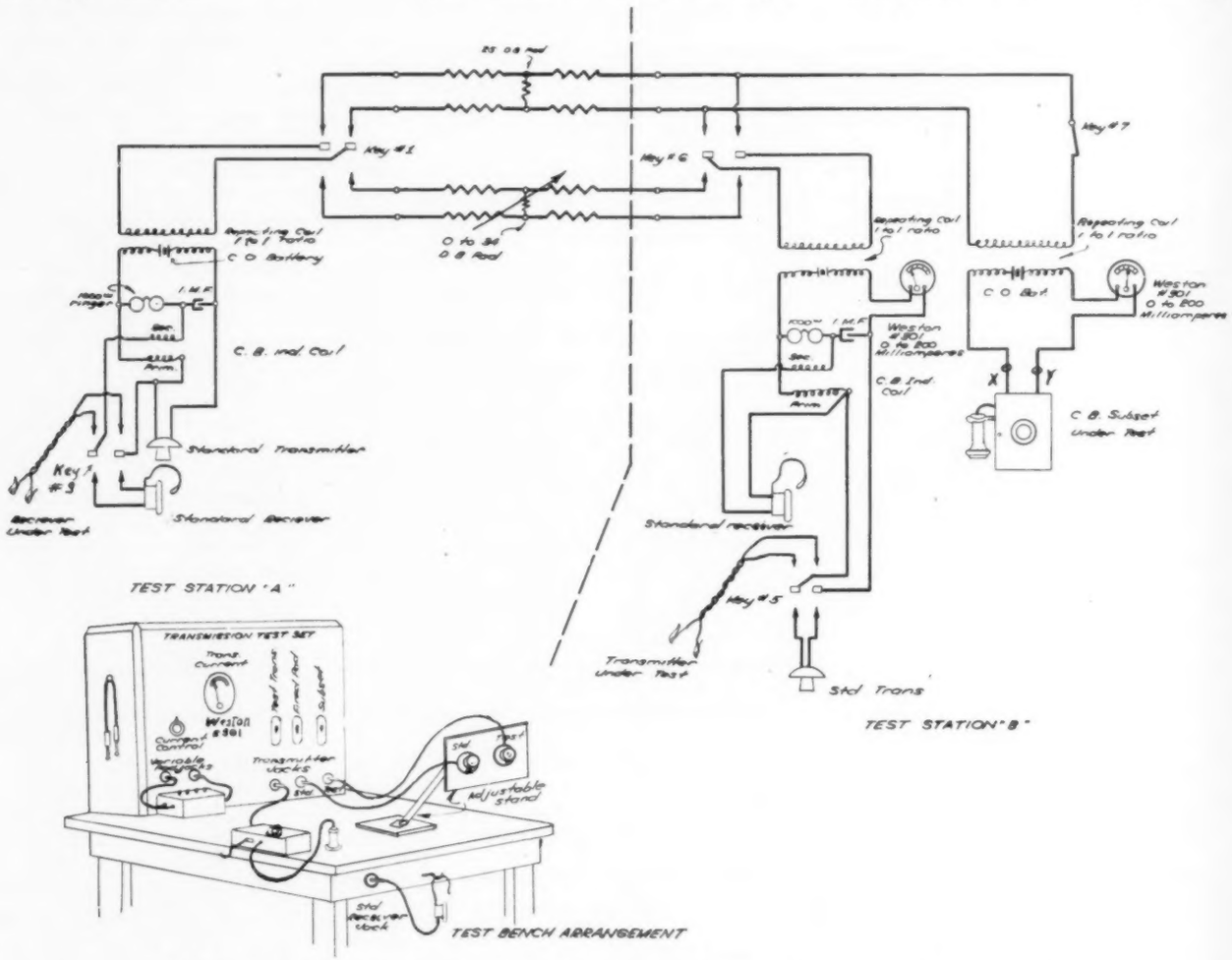


Fig. 6—Transmission testing circuit for subsets, transmitters, receivers. (Common battery)

Transmission Testing Circuits

Bench transmission tests on complete subscribers' sets and on transmitters and receivers are necessary to insure that used equipment is suitable for placing back in service, and that the transmitting and receiving efficiency of new subscribers' sets, receivers, and transmitters is the best that can be obtained for the money.

The tests which will be described are based on a comparison of volume efficiency of the elements under test as compared to standard elements. In order to make it easy for the listening ob-

keys for cutting each network in and out of circuit. However, if keys can be obtained with the necessary contacts on a single key, then this type should be used in preference to the two key arrangement as shown.

The individual networks are of the H type and should be arranged to have a characteristic impedance of 600 ohms, and should be non-inductively wound.

"The author of this article has prepared a complete set of plans for constructing and wiring the transmission testing arrangement described in this article. Using these plans anyone can easily construct such a testing circuit using old telephone equipment usually available. The plans include all the necessary resistance values for constructing the variable and fixed networks, also complete operating instructions and suggestions for using such a testing arrangement to best advantage."

"A number of sets of these plans and instructions are available at one dollar each to cover the cost of handling, and can be obtained by writing B. C. Burden, 855 South 37th, Lincoln, Nebr."

Testing Procedure

Subset testing—*Transmitting Efficiency*—In testing the efficiency of a complete subset, it should be connected to terminals x-y (see figure 5 or 6). The transmitting efficiency is then determined by talking alternately over the transmitter of the standard set and the transmitter of the set to be tested to a listening observer at station A. The listening observer follows the talking tester's change from standard to test transmitter by means of switching key No. 1, and noting the difference in volume over the two legs he adjusts the variable pad until the received volume is the same. The difference in volume efficiency of the standard transmitting circuit as compared to the transmitting circuit under the test is then obtained by subtracting the amount of loss inserted in the variable and fixed pad.

For example, if equal volumes were obtained with 19 DB in the variable pad, then the subset under test would be 25 minus 19 or 6 DB better in transmission efficiency than the standard. During this test the keys No. 3-5-6 are operated so as to connect the standard receiver and transmitter, and so that the standard subset B is connected to the variable pad. The key No. 4 should be closed to supply battery to the standard transmitter (local battery cct.). Key No. 7 should be closed in case of a common battery circuit.

Receiving Efficiency—The receiving efficiency of the subset is determined by talking over the standard set at A and alternately throwing this set from the fixed to the variable leg by means of Key No. 1. The listening observer at B listens to the volume received over the standard receiver and the receiving circuit of the set under test and then adjusts the variable pad until the same volume is obtained. The efficiency of the receiver under test as compared to that of the standard is then obtained as previously explained. In this test, keys No. 3-5-6 should be operated to connect the standard transmitter and receiver, and to connect the standard subset to the variable pad.

If it is desired to test a transmitter alone it is connected to the clips attached to key No. 5 and tester at B talks alternately over the standard and the test transmitter operating keys No. 5 and No. 6 as the shift is made from one transmitter to the other. Note—The keys should be operated so that key No. 6 opens first and closes last. This is necessary to avoid severe clicks in tester A's receiver. The listening observer at A follows the tester at B by means of Key No. 1. The variable pad is adjusted until the received volume is the same and the efficiency is then obtained as previously explained. Key No. 7 (figure 6) should be open and Key No. 4 (figure 5) closed.

The efficiency of a receiver is determined by connecting the receiver to be tested to the clips attached to key No. 3. The tester at B then talks over the standard transmitter throwing alternately from one leg to the other by means of key No. 6. The listening observer at A follows by throwing keys No. 1 and No. 3 so that the standard receiver is connected to the variable pad at the same time tester B is talking on this leg and the receiver under test to the fixed pad when tester B is talking on this leg. The volume received over each leg is noted and the variable pad adjusted until both are the same. The efficiency is then determined in the usual way.

In making the tests described it is essential that the talking tester maintain a constant volume and that his lips be kept about one-half inch from the edge of the mouthpiece. In order to co-ordinate the switching from one leg to the other the talking tester should repeat as follows—three-six-eight, three-six-eight, and then shift to the opposite circuit. The numerals three-six-eight are used in the talking tests as they give a considerable tone variation.

The tests described determine the volume efficiency which is a fairly accurate measure of the transmitting ability of a transmitter, although it should be kept in mind that a transmitter having considerable volume may give poorer overall transmission than one which may be somewhat poorer from a volume efficiency standpoint, but which reproduces the voice with greater fidelity.

Tests to determine the impairment due to distortion will not be described as they are involved, and require a great deal of time and effort.

The variable pad should be so arranged as to permit removing from test station A and insertion at station B. This is necessary when testing the receiving efficiency of a subset.

The standard receivers and transmitters are selected by testing a number of new transmitters and receivers and picking ones which seem representative of the particular make being tested.

In an exchange where it is desired to test both C.B. and local battery telephones, the two circuits shown in figure 5 and 6 may be combined on one panel.

RELATES MODERN MIRACLES OF TELEPHONY

By Ray Blain

On October 17 at the Stevens Hotel in Chicago, before the Independent Telephone Association and the Illinois Manufacturers Association, Dr. Sergius P. Grace gave a demonstration of latest developments in the Bell Telephone Laboratories, of which he is assistant vice-president. It will attempt to relate just what took place although those who have not heard Dr. Grace doing his stuff cannot be expected to get near the full effect from my crude efforts that they would have from his actual demonstration.

When Dr. Grace began to speak it was noted that his well modulated voice carried to the farthest corner of the auditorium. While the room was equipped with a public address system there was no microphone in evidence. The joker was that he carried a small microphone in his vest pocket which he actuated by vibrations of the chest. This is a big improvement over the regular stand type and a real boon to any public speaker, especially one who must refer to notes. Perhaps it even could be equipped with shock absorbers and used by opera singers.

Dr. Grace said the transatlantic telephone cable now under construction would soon make possible constant reliable telephone service with Europe. There is a replica of this cable constructed at a cost of one hundred thousand dollars in the laboratories, where it is being used in transmission studies and the development of terminal equipment, he said. The real cable will cost about ten million dollars, will be provided with continuous loading of perm-alloy, and will be insulated with a new substance known as Para Gutta, according to Dr. Grace. Gutta percha, the substance ordinarily used for submarine cables, is not considered a sufficiently good insulator for a telephone cable of this length.

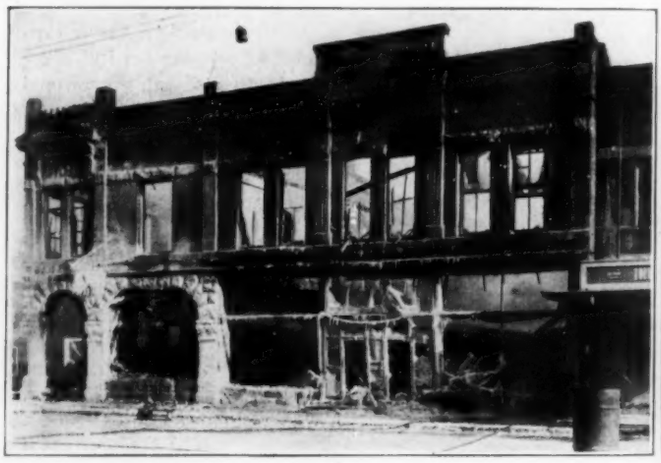
An artificial larnyx consisting of a tube-like arrangement which, when placed in the mouth, can be used to produce speech without the use of vocal cords,

(*Continued on page* 53.)

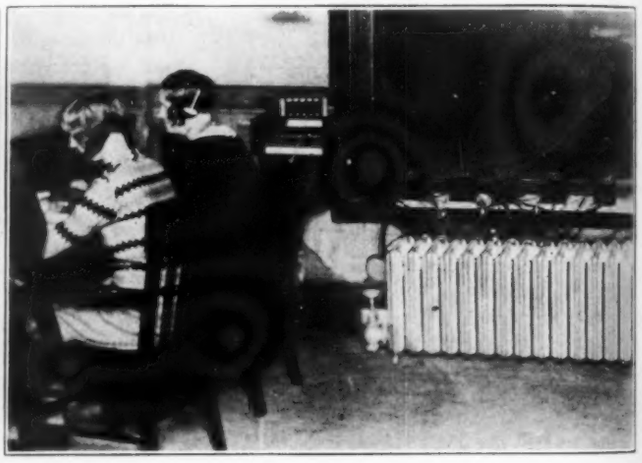
Winnebago, Minnesota, Has New Exchange

The Blue Earth Telephone Company at Winnebago, Minnesota, Suffers Severe Loss by Fire—Only Operator's Headset and Records Saved—New Kellogg Universal Switchboard Replaces Old Equipment—Higher Rates Obtained. By Jay Houghtaling, Representative, Kellogg Switchboard and Supply Company, Chicago.

Listed among the unfortunate events in the city of Winnebago, Minn., during 1929 is the fire that caused the loss of $150,000 in one of the busiest centers of the city. The fire was discovered by one of the citizens who called the night operator of the Blue Earth Telephone Company. After notifying the manager, Mr. D. Crawford, the operator remained at her post until every fireman had been summoned, even though the room was filled with suffocating smoke. The basement and stairway were already in flames and to remain any longer was dangerous. Being assured that there was no other alternative, the operator thoughtfully called her mother, saying she was then leaving, and bravely climbed through a broken window and down a dizzy ladder. The faithful and brave operator was still wearing her headset, the only piece of telephone property saved. Mr. Crawford arrived just in time to rescue the records and cash box.



Old telephone building of the Blue Earth Valley Telephone Company at Winnebago, Minn., as it looked immediately after fire



View of temporary toll quarters in lobby of town hotel following fire in the telephone building at Winnebago

Mr. W. A. Eckles, president and general manager of the telephone company, arrived from Blue Earth and arrangements were made for temporary quarters in the lobby of the town hotel. Within a few hours his force of workmen had connected toll lines to Minneapolis and St. Paul, and a little later had all toll lines leading into the city hooked up and in operation. Within 24 hours local business houses were connected with the long distance lines.

The Winnebago Community Club called a meeting to discuss the question brought up by Mr. Eckles regarding the purchase of new equipment that would give improved service at higher rates. The business men were soon convinced of the need for this up-to-date service and agreed to pay a higher rate for common battery service.

Mr. Eckles immediately made arrangements to temporarily rent a magneto switchboard. This board was placed in new quarters and used until the new Kellogg three-position common battery multiple switchboard was installed. The new board has an ultimate capacity of 1,600 common battery local lines, wired for and equipped with 340 common battery local lines at the present time, 20 magneto toll lines and 40 magneto rural lines. Position No. 1 is arranged for toll service and positions 2 and 3 for local and rural service. The cord circuits are arranged for automatic ringing with revertive ringing tone on common battery connections. All cord circuits, with the exception of the toll cord, are universal. Provision is made for two-party divided circuit ringing.

The citizens of Winnebago, as well as the telephone company, are very proud of their modern common battery service. Winnebago is a thriving city of approximately 2,000 in population, situated in the heart of Minnesota's corn belt. It is located in Faribault County, 40 miles northwest of Albert Lea. The Chicago, Milwaukee & St. Paul and the Chicago, St. Paul, Minneapolis & Omaha railroads serve the town. That it is primarily a farming community can be seen by the type of industries located here. There are three large companies operating a canning, a produce, and a creamery plant, and all are doing splendid business and employing many people.

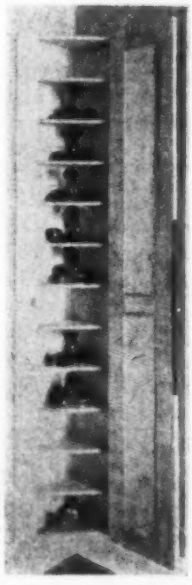
Thousands of acres in the vicinity are devoted to the raising of peas and corn which gives the canning company plenty of work to do. Prosperous conditions of the creamery and produce companies indicate that dairying and poultry have an important place in the farmer's program. Among some of the other industries are a brick and tile plant, flour mill and nursery. The town also has two newspapers, one established in 1865 and the other in 1893.

The Blue Earth Telephone Company was started about 1895 by W. Z. Haight and was operating small exchanges at Winnebago, Wells and Blue Earth, Minn. Later these towns were all connected by toll lines and the lines were extended to Mankato, Fairmount, and other points. Some time later this company was taken over by a stock company of which W. D. Hodgman was secretary and manager. In a few years A. W. Calvin purchased the controlling interest and sold the toll lines to the Bell Company. In 1913 D. W. Gretotex and his brother-in-law, Mr. W. A. Eckles, bought the majority of stock in the Blue Earth Telephone Company. This arrangement continued until Mr. Gretotex died in 1923 and Mr. Eckles acquired the controlling interest.

(*Continued on page* 36.)

LINE AND DESK

A PRACTICAL CABINET FOR OPERATOR SETS



A corner and an easily made cabinet is all that is necessary for keeping the operator's sets out of the dust and protected against breakage.

The accompanying picture shows a neat triangular shelf arrangement which is closed with a door and latch affording every protection. Some exchanges have a system of hooks but here the chance of confusion of the equipment and greater risk of breakage makes this plan less efficient.

An old switchboard cabinet can be equipped with the shelves and partitions for holding the head sets, but we believe the triangular cabinet illustrated is the handiest and most compact, occupying minimum of space and within easy reach of the operators.

HELP WANTED POSITION WANTED

Beginning with the December issue of Telephone Engineer we will publish Help and Position Wanted classified advertisements for the benefit of our friends in the telephone field.

This service is free to everybody in the telephone industry.

Simply make up your ad, mail it to the Telephone Engineer, Classified Department, 192 N. Clark St., Chicago. We will give it a key number and publish it in the next issue and all answers received will be forwarded to the advertiser immediately.

State qualifications, kind of work, salary, experience and any other important information, so as to eliminate unnecessary correspondence.

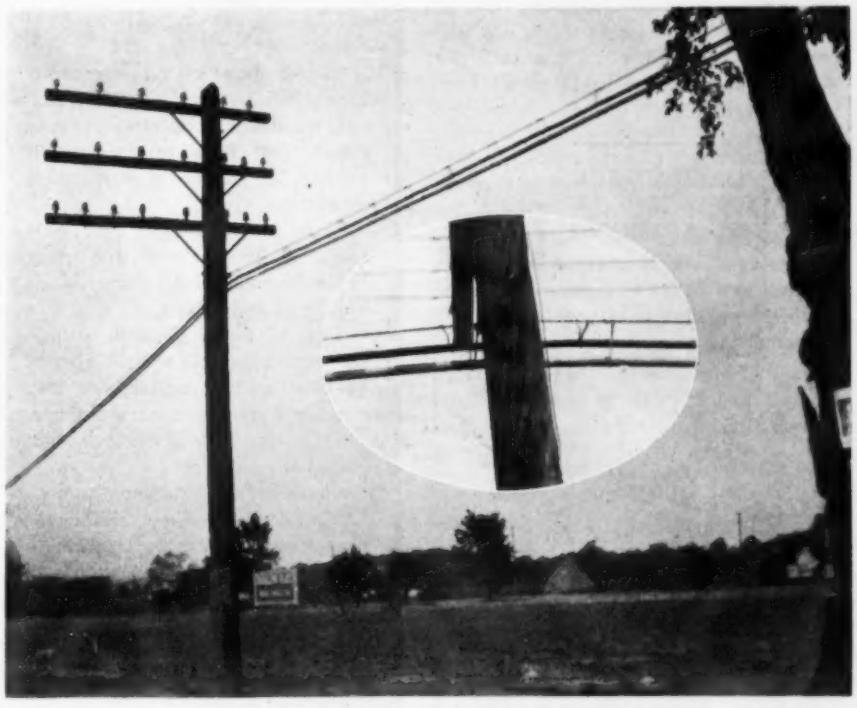
Telephone Engineer, always anxious to be of utmost value to every telephone man, believes that this added service will be found as profitable for the manager looking for help as for the man who wants a position, whether it be in the office as troubleman or on the construction gang.

This service is yours—Use it.

NEW CABLE RINGS BY RAY BLAIN

Just when I had about decided there was nothing new under the sun I took a ride one evening and noticed two cables suspended on one messenger, one in the usual position and one a few inches below it. Now there have been times when I was young and foolish, when I looked at one pole or cable and saw two, but that was before the days of Volstead and I was sure that this was not an optical illusion brought about by over indulgence. So I just decided that I had stumbled onto something new as shown by the accompanying picture.

At least, occasionally, there will come a time in the life of every telephone man when two cables must be strung on one pole line. Of course the correct way would be to remove the cable and replace it with a larger one but the cost of this method is prohibitive. It was at one time thought possible to place two cables in one set of rings but this brought about much grief and was soon abandoned. Then for years it was common practice to string a second messenger on the same suspension bolt but on opposite side of the poles to carry the second cable. This method was satisfactory but expensive and usually about the only advantage was when a toll lead was on the same poles it was possible for a lineman to walk the messenger while holding onto the wires to remove kites. Everything was fine except when the operator started ringing while he was doing the wire walking act.



Showing how one messenger can carry two cables and do the job neatly and efficiently

But there still exists in many localities cases where a second cable must be placed parallel to one already in service and the new method of providing a long ring to be placed between the ordinary ones to carry the new cable below it seems to be the ideal method. This seems to be just as satisfactory as running a second messenger and is surely more economical.

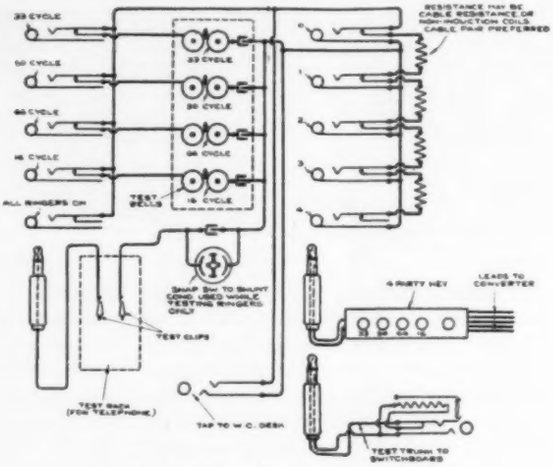
A HANDY TESTING CIRCUIT EASILY MADE

Oftentimes considerable trouble is experienced when replacing or installing a harmonic telephone in securing perfect frequency adjustment especially when this has to be done at the place of installation.

The circuit shown here is for testing harmonic ringers or telephones before they are taken out for installation.

The ringer to be tested is connected to the regular test bells through a series of resistance units. This not only introduces an artificial cable or line condition, but permits the ringer to be adjusted with other ringer frequencies on the line, thereby eliminating cross ringing and the necessity of adjustment by the installer on the job.

This test set can be easily constructed with keys and jacks, available around the stock room, mounted in an old telephone cabinet. This, with a rack for holding the telephone to be tested comprises the outfit.



An easy way to make sure your telephone ringers are adjusted exactly with your ringing machine frequency

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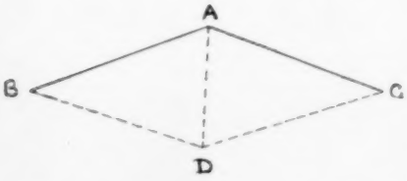
QUICK METHOD FOR LOCATING BISECTING ANGLE OF A CORNER

Here is a simple method which can be used without the need of a lot of geometry or what have you.

The foreman stands at A, the intersection of the lines of the leads. Two men, B and C with a tape line, hand line or a length of wire assume positions



B and C so that the center of this line falls at the point held by the foreman at A. Thus A B and A C are equal. The foreman then lines in B and C with the leads. After leaving a marker at point A he walks toward point D until the wire or tape becomes tight again. This locates point D, giving the line A D as the bisecting line of the angle.

EUGENE DAVIS, Salina, Kansas.

A telephone construction project has been completed at Chillicothe, Mo., costing about $22,200, providing additional wire facilities and replacing old equipment in the local exchange.

TELEPHONE THINGS I DIDN'T KNOW UNTIL NOW

By Ray Blain

That a watertight cable terminal is being manufactured which can be installed and used in manholes.

That a shunt type Dynamometer is being manufactured which can be used to determine accurately just how much tension should be put on a suspension messenger.

That the new type 1800 pair cable is being used for riser cables in some of the larger office buildings and hotels.

That in locating cable trouble the exploring coil should always be held on the under side and exactly opposite the messenger.

That the unit of transmission Deci-bel can be used to designate **the volume of any noise.**

That a machine is available for use on an automatic telephone whereby a subscriber can dial a number and receive the time of day correct to the second.

That telephone numbers in New York can be dialled direct from Chicago.

That the new Transatlantic telephone cable will cost something over ten million dollars.

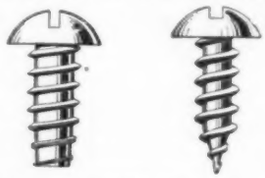
That telephone operators generally make good in the talkies.

That moisture will sometimes travel twenty to thirty feet in a paper cable.

SELF TAPPING SCREWS

Few seem to realize the many advantages around a telephone exchange for the use of self tapping screws. These screws are used after first drilling a hole and turning the screw into it which cuts its own thread. This eliminates the need of taps which are both expensive and difficult to keep in good condition around a bunch of linemen.

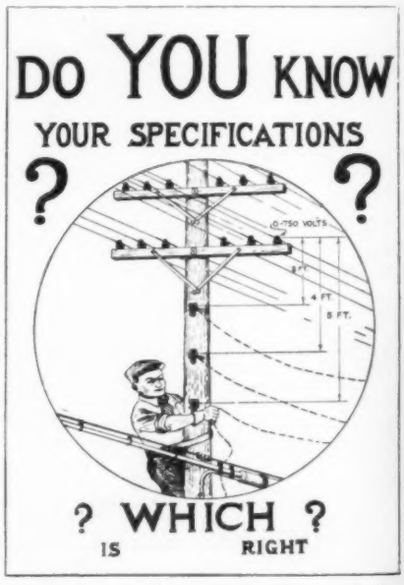
The need of such self tapping screws



The above illustrates two sizes of top screws

in telephone work is numerous. They can be used for mounting parts on the metal case of telephones where many times the original threads are stripped and by use of a slightly larger self tapping screw new threads are cut and repairs made without difficulty. Repairs or reinforcements on metal terminal covers can be taken care of easily and quickly.

In fact the needs of this self-tapping screw around the average telephone exchange are so numerous that there is no excuse for not keeping a good supply of them on hand in the storeroom at all times.



Study the above illustration and decide where this line should be run—whether it should be three feet, four feet, or five feet from the power line.

The correct answer to the above will be printed in the December issue of TELEPHONE ENGINEER.

Each month we will illustrate a telephone construction problem for you to solve, and then will publish the correct answer the following month. It may be possible that through the course of these problems, there may be some that are identical with problems confronting yourself, and we hope that they will prove of value to you. Follow the series and see how accurate you are.

Ohio Exchange Installs Feature Board

Ohio Associated Telephone Company Installs Feature Switchboard at Its Bryan, Ohio, Exchange. Cut-Over Brings Many Visitors to Ohio Town—J. E. Finley, Stromberg-Carlson Sales Representative.

The public is always ready to give praise when praise is deserved. The Ohio Associated Telephone Company has found this to be true, especially of its public in Bryan, Ohio.

Recently that company opened its new telephone plant in which is installed a new seven-position Stromberg-Carlson central energy switchboard. Since the time of the cut-over to the new equipment, telephone subscribers in Bryan have continually praised the company for giving them the most up-to-date and efficient telephone service.

The opening of the new plant and the cut-over from the old magneto system brought many visitors to Bryan, among whom were prominent telephone men of Ohio and adjoining states, who praised the new system and proclaimed it one of the best for an exchange the size of Bryan. Unusual interest was manifested in the new and modern telephone office building and the Ohio Associated officials were complimented for the notable improvement they had made to give their subscribers the best of service.

Charles R. Lowe, manager of the Bryan, Ohio, exchange

Among the visitors were: A. C. Morse, assistant to the president of the United Telephone Company, Cleveland; G. T. Corl, of Coldwater, auditor, and R. C. Smith, of Cleveland, traffic superintendent of this company; O. B. Conner, of Blissfield, F. E. Miller of Coldwater, and H. P. Miller of Sturgis, division managers of the Michigan Telephone Company; Fred Showalter, manager, and Minnie Kerr, formerly manager of the Butler Exchange; C. E. Roosa, manager at Fayette; Charles Sucher, formerly of Bryan, now of Findlay; O. R. Stearns and J. J. Foeller of Toledo, who are with the Ohio Bell; J. E. Finley of Columbus, and H. G. Almquist of Toledo, Stromberg-Carlson representatives.

The Bryan exchange up to 1927 was owned and operated by the Williams County Telephone Company. That company was formed 32 years ago and grew from 250 subscribers in 1898 to 4,200, in addition to the 1,650 connected with the Bryan exchange, in 1927, when it was sold to the Ohio Associated Telephone Company, owned by the United Telephone Company.

Charles R. Lowe became manager of the Williams County Company system in 1919. At that time the company was facing many difficulties. Mr. Lowe toiled with tireless effort and had placed the company on a splendid basis when in 1924 a severe sleet storm hit the Middle West and practically demolished the entire system. Mr. Lowe again put his shoulders to the wheel and had by 1927 put the system on a sound platform. When the Ohio Associated Company took over the system they retained Mr. Lowe as manager of the Bryan exchange. Immediately plans for building a new building and the installation of new equipment were begun.

When it was decided by the United Telephone Company officials that new equipment was needed in order to give subscribers the best service possible, they made studies of every type of equipment. After many conferences and discussions it was decided to purchase a Stromberg-Carlson central energy switchboard. They immediately contracted with that company for that type of board to include the following features:

Operator's cut-in which makes it possible for the operator's set to be cut in on the cord circuit immediately upon plugging into the jack and the answering plug.

Operator's bar which prevents an operator making connection to a line circuit upon which a connection has already been established through the medium of another similar cord circuit.

Audible busy test which guards against connections with busy lines.

Operator's ringing control which includes individual four-party ringing keys per cord pair for selecting proper ring-

Stromberg-Carlson Super-service switchboard in service in the Bryan, Ohio, exchange of the Ohio Associated Telephone Company

ing frequency and also includes cam type key for ringing code on rural lines.

Machine ringing which signals the subscriber intermittently.

Ringing tone which indicates to the calling subscriber that the called subscriber is being signalled. This tone reduces the number of recalls resulting from a slow answering of the called party.

Instantaneous ringing cut-off which discontinues intermittent ringing instantaneously when the called party responds. This applies to either the silent or ringing period of the signalling cycle.

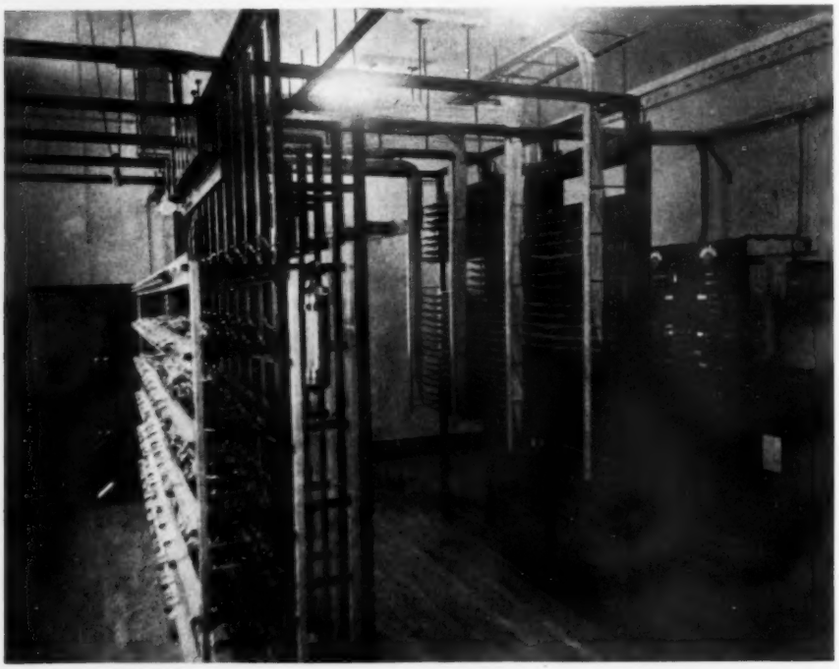
Calling subscriber's ringing control which stops intermittent ringing when the calling subscriber abandons the call.

Dark keyboard which gives indication as soon as the operator depresses ringing button.

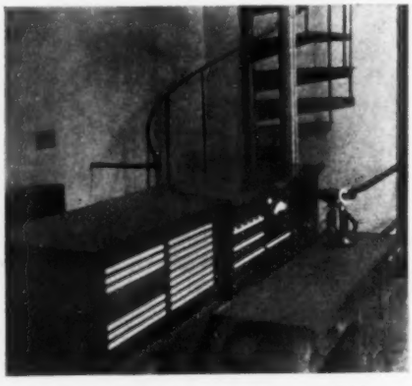
Positive supervision which informs the operator by lighting the supervisory lamp when either party returns his receiver to the hook by lighting the supervisory lamp.

Line lamp recall on answering cord only allows the subscriber to regain the operator's attention by a reappearance of the subscriber's line lamp.

Call registration which registers all calls answered by the operator. The subscriber's receiver must be off the hook switch to allow the meter to operate.



View showing terminal and relay racks, power board and converter in the Bryan, Ohio, exchange



Wire chief's desk in Bryan, Ohio, exchange

Officials of both companies believe that this switchboard gives their customers the best service as it contains features for fast and accurate service.

Those who were in charge of the many details in connection with the installing of this new system and who worked tirelessly, spending many hours' overtime, were W. E. Keller, plant superintendent at Bryan; Edward Evans, wire chief; B. A. Royal, Donald Luke and Ernest Gillespie, cablemen; Louise Taylor, chief operator, and Richard Wenner, Stromberg-Carlson installer.

ANNUAL MEETING OF INDEPENDENT PIONEERS

(*Continued from page 22.*)

ing, was attended by about 1,000 Pioneers, guests and friends. Radio artists entertained the gathering following the luncheon.

The committee in charge of the luncheon and entertainment was composed of George W. Rodormer, chairman; Frank L. Eldridge, L. A. DeBerard, Roy Siemund, A. D. Boal, Carl W. Schafer and John F. Jaap, Jr., secretary and treasurer.

TO REBUILD RURAL TELEPHONE LINES

More than $3,500 will be spent in Oelwein by the Northwestern Bell Telephone Company on an improvement program, now under way, to provide metallic or two-wire service on seven farm lines now having grounded or one-wire service.

The establishment of metallic service on these lines is being done at this time in order to give a better grade of rural service. Interference and cross-talk will be materially lessened when the two-wire service is established. The farm lines affected are those numbered 10, 13, 14, 17, 18, 24 and 25.

In connection with the improvement program, 365 feet of cable on South Frederick avenue will be replaced with a larger cable to provide additional facilities for handling the telephone traffic, while an extension of 920 feet will be made to the cable on Tenth street, permitting the removal of an open wire line of 10 wires on which trees interfered with the service.

The entire project here consists of placing 230 poles, 30 crossarms, 1,285 feet of cable and 50 miles of wire, and the removal of 238 worn out poles, 55 crossarms, 345 feet of cable and 27 miles of wire, in addition to the lowering of 55 poles and the trimming of trees to eliminate interference.

The Associated Telephone Utilities Company has purchased the Wise Telephone Company, the Freeman Telephone Company and the Holton Telephone Company, all of Wisconsin. Addition of these companies increases the number of communities served by the Associated Telephone Utilities System to 1,600.

The Cozad Mutual Telephone Company of Cozad, Neb., has been given authority by the state railway commission to increase its rates and also to establish common battery service to handle increased communication service needed there. The new rates are to go into effect when the common battery service is installed.

Citizens of Dawson, Minn., recently called a mass meeting at which they protested against the telephone service given them by the Central West Public Service Company. A committee was named to confer with the company in an effort to improve the service.

The Pennsylvania Public Service Commission has approved the merging of the Johnstown Telephone Company with the Western Pennsylvania Telephone Company. Consolidation of exchanges will take place in the near future.

The continent that became a neighborhood

An Advertisement of the American Telephone and Telegraph Company

THROUGH slim wires etched against the sky . . . through cables laid in the earth under cities and fields . . . millions of Americans, miles or days' journeys apart, speak to each other as readily as though they stood face to face.

Over her telephone, a housewife in a Wisconsin town inquires about a dress pattern from a friend who lives nearby. Over his telephone, a business man in Philadelphia talks to another in Denver. Over her telephone, a mother in Kansas asks her son at college fifty miles away if he will come home for the week-end. Over his telephone, a cabinet member in Washington gives instructions to an assistant in Seattle. Regardless of distance and the complexity of modern living, they talk directly and immediately with any one, anywhere, at any time they choose.

The function of the Bell Telephone System is the vital one of making it possible to maintain social and business contacts in cities that contain many times more people than this nation once boasted . . . in a neighborhood which the Census reports to hold 127 million people.

Year after year from its beginning, the Bell System has increased its facilities, its personnel and its usefulness. Looking ahead and planning for the future, it has forwarded the growth of this nation by meeting its communication needs fully and economically. Today it overcomes the hindrances of distance and time . . . and unifies a civilization geared to the habit of instantaneous communication.

Because it serves all who call on it, by enriching their lives and helping to make their enterprises more successful, the telephone plays an increasingly useful part in the every-day activities of the American people.

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

Gary Interests Form International Organization

Formation of the second largest telephone operating company in the world has been announced with the entry of Transamerica Corporation, large holding company of Bancamerica-Blair interests, into the field of international telephony. Previous holdings of Transamerica have been principally banks and financial institutions.

The General Telephone and Electric Corporation has been formed through the affiliation of Theodore Gary and Company, an organization of international prominence in the telephone field, Transamerica, and important British interests.

The new company will have as its nucleus the Association Telephone and Telegraph Company, now owned and managed by the Gary interests in conjunction with important British associates. The value of its combined properties totals more than $75,000,000. It is emphasized that, except for manufacturing, the activities of General Telephone will be entirely outside of continental United States.

The authorized capital of General Telephone is 5,000,000 shares of common stock. For their permanent investment the Gary interests and Transamerica are taking over $20,000,000 while British and other associates are taking approximately $6,000,000. No public financing is at present contemplated.

For some thirty years Theodore Gary and Company has controlled and operated Independent utility properties in the United States. For a number of years they have controlled manufacturing companies both in the United States and abroad including Automatic Electric Inc., manufacturers of the automatic telephone; and American Electric Company, Inc.

This great expansion in foreign fields is seen as a natural development for this organization. General Telephone, combining the Gary organization's experience and technical skill, with Transamerica's resources, will control and operate, with the exception of the Bell System, more telephones than any other privately owned company.

H. L. Gary, president of Theodore Gary and Company, will become chairman of the General Telephone and Electric Corporation. Its president will be A. F. Adams, now chairman of the Gary Company. Elisha Walker, chairman of Transamerica, will serve as chairman of the executive committee of General Telephone, which committee will also include Jean Monnet, vice-chairman of Transamerica. Theodore Gary will serve on the board of the new corporation.

E. C. Blomeyer of Chicago, now executive vice-president of Theodore Gary and Company, and Rene Pleven of Paris, will become vice-presidents of General Telephone.

Elisha Walker, chairman of Transamerica, replying to an inquiry concerning his views as to the significance of General Telephone's formation, stated:

"Through three decades, the men associated in the Gary companies have built up an organization whose technical and managerial competence is known to communication experts the world over. These recent negotiations have affected what we believe to be an auspicious alliance of that experience and skill with resources now made available by Transamerica.

"With few exceptions the telephone systems outside North America are greatly underdeveloped and public sentiment in such countries is eager for increased development. They have in mind that extensions of the telephone systems provide an economic impetus to the business of each country. The potential demand for telephone extensions should alleviate unemployment.

"I am informed that the ratio of population to telephone instruments in the United States is somewhere in the neighborhood of 5 to 1, while outside this country it is nearer 100 to 1.

"In view of that radical divergence and having in mind the financial backing now provided for General Telephone and Electric Corporation, we may anticipate, I believe, a continuing development in telephonic communications overseas."

SANTA'S GIFT OF HEALTH

By Elizabeth Cole

The Christmas season would not seem complete without the brightly colored health seals. On this year's seal jovial old Santa Claus beams out to announce that he is bringing the greatest and most lasting of all gifts—health.

Funds from the sale of the penny seals are used to educate people in the ways of healthful living. The money is devoted to an all year round campaign to prevent sickness, with special emphasis on keeping children well. Santa Claus in this way, therefore, is bringing millions of gifts of health for 1931.

Accumulated pennies can accomplish much, and since 1907 when the seals were first sold to control and stamp out tuberculosis, the death rate from this disease has been decreased from 178.5 per 100,000 population to 79.2 per 100,000 population in 1928. Children have profited most from the knowledge gained through this educational campaign. For the ten-year period, 1917 to 1927, the tuberculosis death rate for the country as a whole declined 45 per cent, while the rate for children under five declined 63 per cent. By concentrating effort on the child through providing open air classrooms, preventoria, health camps for the under par children and by teaching them to make health a habit, the amount of adult tuberculosis is greatly reduced.

The age period in which the death rate has declined less noticeably is from 15 to 45, the producing years. For boys and men the decline has been greater than for girls between 15 and 19. Comparative statistics show that for girls in this age period it has declined only 33 per cent, but for boys it has declined 47 per cent. Every third girl who dies from any cause between the ages of 15 and 19 dies from tuberculosis. For the ages 20 to 24 the decline for women has been 34 per cent; among men 50 per cent. This situation is certainly serious, but if sufficient effort is given toward protecting the young children, the elder ones are bound to benefit.

Santa Claus, the beloved of children and the symbol of unselfish joyousness, is a fitting subject for the 1930 Christmas seal. Use the stickers on your mail and packages, not only to make them, but also to signify that at this season you feel like joining Santa Claus in giving the precious gift of health.

CHRISTMAS

with its joy and good will—why not extend its spirit over the whole year? The fund from the sale of Christmas seals in December will carry help and education against tuberculosis throughout all 1931.

The National, State & Local Tuberculosis Associations of the United States

Buy Christmas Seals
Fight Tuberculosis

but now Victoria dials

Accustomed hitherto to the manual method of obtaining telephone connections, the citizens of Victoria, B. C., will quickly appreciate the advantages of modern Strowger Dial Service.

Following the example of most of the World's leading telephone administrations, the British Columbia Telephone Company, by adopting Strowger has ensured for its patrons the most efficient telephone service possible in the light of modern knowledge and experience.

This equipment, which represents the latest phase of Strowger Automatic Telephone development was supplied by Automatic Telephone Manufacturing Company, Ltd., in co-operation with the Independent Sales & Engineering Company Limited, Vancouver, B. C.

STROWGER AUTOMATIC EXCHANGE, VICTORIA, B.C.

Automatic Telephone Manufacturing Co., Ltd.

Strowger Works, Liverpool, England

OVERSEAS DISTRIBUTORS

The International Automatic Telephone Co., Ltd., London

News From the Field

Recent additions to the long distance telephone system in Georgia include new direct circuits from Atlanta to Nashville, Tenn., to Cordele, Ga., and to Bainbridge, Ga., and two new circuits extending from Macon to Unadilla, Grovania, Elberta, Bonaire, Kathleen and Houston Siding, Ga., according to announcements of officials of the Southern Bell System.

The Southern California Telephone Company will install 21 miles of underground telephone cable between Los Angeles and Long Beach at an estimated expenditure of $361,840. Work on the cable will start the first of next year.

The Independent Telephone Company of Battle Creek, Mich., has been purchased by the Western Telephone Company. Louis Deer, manager, will be succeeded by Dudley Flater.

An appropriation of $5,085,464 for new construction has been authorized by the Board of Directors of the Bell Telephone Company of Pennsylvania, bringing the total appropriated so far this year to $32,328,623.

The first telephone line in Muskogee, Okla., was installed 43 years ago. It extended from Muskogee to Checotah. It was not until 1896 that a local exchange was established, with approximately fifty subscribers.

Employes of the Corning telephone exchange, Corning, Ia., have completed a ten-day Sell-A-Phone campaign, with the result that 59 new subscribers have been added to the list.

The West Iowa Telephone Company at Rock Rapids, Ia., recently opened its new telephone building and exchange.

The Wisconsin Telephone Company will spend $14,000,000 in the greatest expansion program of its history, according to John O'Day, vice-president. The company has increased employment from 6,300 in 1927 to 9,200 in 1930. New Sheridan and Mitchell dial central offices are under construction in Milwaukee, and additions are planned at Appleton, Eau Claire, Madison, Oshkosh and Stevens Point.

The Illinois Bell Telephone directors have approved the expenditure of $2,007,032 for a plant in Chicago and $1,219,511 for a plant in Illinois outside of Chicago. Expenditures approved for Illinois so far this year total $20,118,719.

Construction of a toll line from Versailles, Mo., to Eldon, Mo., will begin at once, according to an announcement from officials of the Scotia Telephone Company of Versailles. The new line will be of metallic construction and will give patrons of the Scotia Telephone Company direct connection with Eldon, Bagnell and Linn Creek, Mo.

The Bell Telephone Company plans construction of additions to existing aerial and underground telephone cable network in Baden, Pa., to cost more than $25,000 for the establishment of a dial system of telephone operation.

The Southwestern Bell Telephone Company plans a new building in Sweetwater, Tex., construction of which will be started soon.

Plans are under way for the consolidation of eight Tennessee and Kentucky telephone companies, all of which are controlled by the Continental Telephone Company of Kansas City, Mo., according to James M. Cox, president of the Gainesboro Telephone Company, Cookeville, Tenn.

The Utilities Service Company, of Alliance, Ohio, and its subsidiary firm, the Suburban Light & Power Company, have gone into the hands of receivers. The Utilities Service Company is the holding company for the Lima Telephone & Telegraph Company, of Lima, Ohio. Suit against the two companies was brought by the Chase National Bank of New York, which made large loans to the organization for an expansion program.

C. F. Ensor, 40, manager of the Marion telephone office, Marion, Ill., died suddenly from a self-inflicted bullet wound, October 12. Authorities claim the shooting occurred while Ensor was cleaning a shotgun.

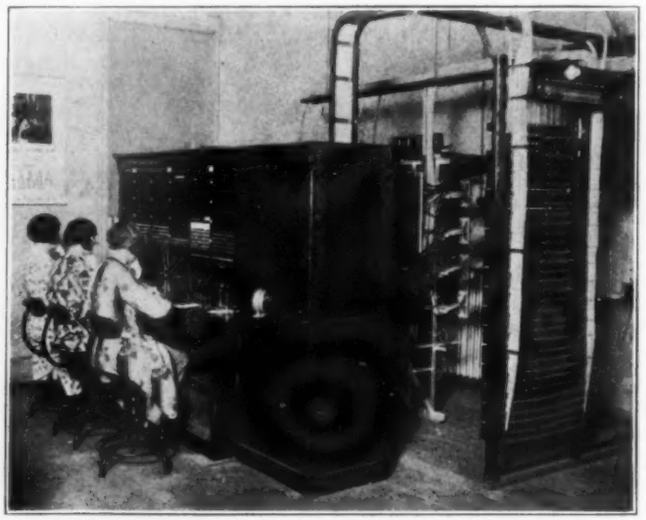
The Mid-West Telephone & Utilities Company of Petersburg, Ind., has been placed in the hands of receivers following suit brought by the Telephone Construction & Distributing Company, also of Petersburg, on a claim of $9,900. The Mid-West recently took over the business and property of the Pike County Telephone Company, one of the largest Independent companies in southern Indiana.

The Alabama Public Service Commission has approved sale of the Gentry Telephone Exchange in Limestone County to Miss Minnie Johnson.

WINNEBAGO, MINNESOTA, HAS NEW EXCHANGE

(*Continued from page* 28.)

This company now owns exchanges in Elmore, Wells, Blue Earth, as well as surrounding territory and at present has over 400 common battery subscribers and close to 400 rural stations. Mr. W. E. Eckles of Blue Earth is president and general manager, and Mr. David Crawford is the local manager of Winnebago. The Blue Earth Telephone Company is to be congratulated upon the fine service they are now rendering their subscribers in Winnebago.



The new Kellogg switchboard installed at Winnebago, Minn., by the Blue Earth Valley Telephone Co., has an ultimate capacity of 1,600 common battery lines

at Winnebago with an approximate total of 2,200 common battery and magneto subscribers.

The Winnebago exchange serves the towns of Winnebago, Huntley and the

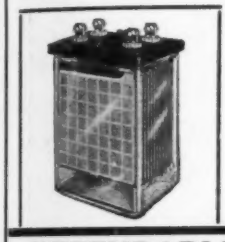
Get EVER-PROTECT aid in your construction.

EVER-PROTECT has proved practical and profitable in making many hundreds of cable installations underground without a conduit. It protects cable against storm damage, corrosion, chemical action, electrolysis and abrasion.

In liquid form EVER-PROTECT is great for overhead work, protecting your cable and messengers against chemical action and other destructive influences.

Ask your nearest jobber for complete details.

National Cable Compound Co.
Incorporated
MITCHELL - - IND.



For Every Job

Dependable battery operation is imperative to uninterrupted telephone service.

Exides are dependable. Thirty-five years of service in the telephone industry have proven that. Dependable Exides assure a long life of satisfactory service.

DEPENDABLE EXIDE BATTERIES

Exide BATTERIES

The Electric Storage Battery Company
Philadelphia Penna.

SOLDER ECONOMY *achieved*

Can You Afford Waste?

No one can. That's why KESTER SOLDER is the standard for quick, easy and economical soldering in the telephone industry. For switchboard and central office work, KESTER Rosin-Core Solder, our own pure plastic type, is used by everyone interested in good work. Outside line work is much better done with KESTER Acid-Core Solder. It is saving time and money for the big companies. Why not let it do the same for you?

Every good jobber stocks KESTER Solder.

KESTER SOLDER COMPANY
INCORPORATED-1899
4218 Wrightwood Ave., Chicago

TELEPHONE WIRES & CABLES

Electrolytic Copper Rods
Bare and Insulated Copper Wires
Switchboard Cables
Rubber Insulated Wires
Magnet Wire Flexible Cords
Enameled Wire Power Cables

Eugene F. Phillips Electrical Works, Limited

(*Established 1889*)
MONTREAL, CANADA
Factories - - - - Montreal and Brockville

The Strowger System in Victoria, B. C.

H. E. Clapham Tells How the British Columbia Telephone Company Converted Victoria Exchange to Dial Operation in a Single Cut, Although 17,500 Stations Were Involved

Since Saturday night, November first, the telephone subscribers of Victoria, the second largest city of British Columbia, and the capital of that province, have been dialing their telephone calls, the change to the Strowger dial system, involving the entire Victoria local area serving 17,500 stations. The transfer of service was a perfect success from every angle, the equipment functioning with the utmost smoothness after a cutover marked only by quickness of action and complete absence of disturbing factors.

The British Columbia Telephone Company, which, with its connecting companies, operate approximately 125,000 telephones in some 70 exchanges throughout the province, has long been sensible of the advantages of dial operation, and has already converted some of its smaller exchanges. In recent years it became increasingly apparent to the management that definite action would have to be taken if the Victoria exchange was to continue to render the high grade of service to which the telephone users had become accustomed. The existing manual switchboard being filled almost to capacity, the telephone company was faced with the necessity of choosing one of three plans. It could install another manual unit, which would mean the employment of two operators for each local call, with consequent slowing up of service; it could install a Strowger dial unit to work in conjunction with the existing manual board—a comparatively complicated arrangement, involving considerable expense and effecting only moderate service improvement; or it could place the entire system on a dial basis.

The latter was obviously, from the standpoint of service, the most desirable choice, and after careful traffic surveys and preliminary engineering studies were made, orders for the entire installation were placed through the Independent Sales and Engineering Co., Ltd., of Vancouver. The engineering and design of the Strowger automatic switchboard was carried out by the staff of the above organization which also manufactured all of the elements of framework for mounting the switch shelves as well as the power board and the various auxiliary manual desks. The same company also handled the entire work of installation. The switches and switch shelves were made by the Automatic Telephone Manufacturing Co., Ltd., Liverpool, and shipped as shelf units to Victoria via the Panama Canal.

Gordon Farrell, president of the British Columbia Telephone Company, expressed keen pleasure at the success of the new system

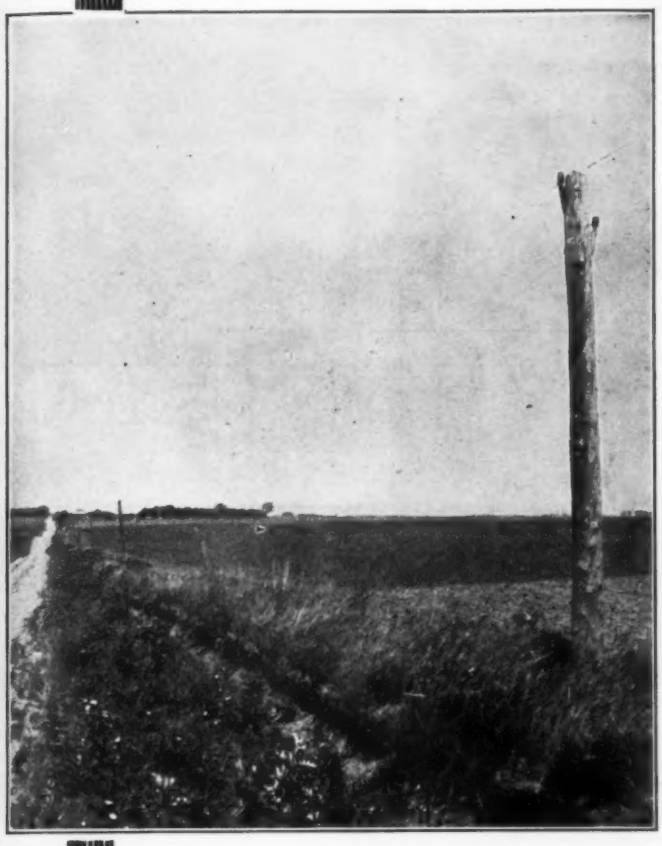
James Hamilton, vice-president and general manager, paid tribute to the Victoria newspapers for their support and to the telephone employees for their work in bringing the cutover to a successful conclusion

Long before the date set for the cutover (November first), the installation of the Strowger switchboard was completed, and every element of equipment tested and retested. Ample time was allowed for the careful checking of all service features to make certain that everything would take place as planned. On Saturday morning preceding the cutover, telephone people began to gather in Victoria from all parts of the province. To avoid hampering the men engaged in cutover duties the number of people admitted to the exchange was strictly limited, admission cards being issued by the officials of the telephone company.

The technical processes of the cutover were relatively simple, the new equipment being installed in a new structure adjoining the old telephone office. The cables leading to the old main frame were tapped in the company's cable vault and new cables run to the new main frame. The automatic switchboard equipment was kept temporarily disconnected from telephone lines at the jacks of the line relay groups, each relay group being lifted sufficiently to disconnect the jack contacts.

As the midnight hour approached, telephone officials and visitors gathered in the new switchroom. James Hamilton, vice-president and general manager of the British Columbia Telephone Co. opened the ceremonies by delivering a brief address in which he extended thanks to visiting government officials and press representatives for their cooperation in making the new system a success. He also complimented the local staff and the officials of the Independent Sales and Engineering Co., Ltd., for their work in connection with the installation and cutover preparations. In reviewing telephone progress in British Columbia Mr. Hamilton pointed out that it had always been the policy of the company to take advantage of the very finest developments that telephone science had to offer, and that the selection of the Strowger dial system was in full accord with that policy. Mr. Hamilton then introduced Mayor Herbert Anscomb of Victoria, who responded briefly and to whom was accorded the honor of making the first of a number of ceremonial calls after the cutover.

At 11:55 p. m. a group of men were stationed at the old main frame, and at



On Duty!

--- since the turn of the Century

For 29 years these 6-inch, 20-foot Northern White Cedar poles have been in service in lines of the Lincoln Telephone and Telegraph Co., in vicinity of Seward, Neb.

NORTHERN White Cedar Poles are long-lived. A great number of them have been rendering reliable service since the latter part of the nineteenth century. They have served through long years without decay; they have stood fast in all kinds of soil; they have the necessary stamina to hold up when the wind and sleet tugs at their cross arms.

Northern White Cedar Poles have the ideal taper that guarantees firm anchorage in all types of ground (one inch to every five feet), they have large, firm butts that give great strength at the groundline, they are endowed with a high resistance to decay.

Northern White Cedar Ass'n.

Minneapolis Minnesota

Northern White Cedar Poles

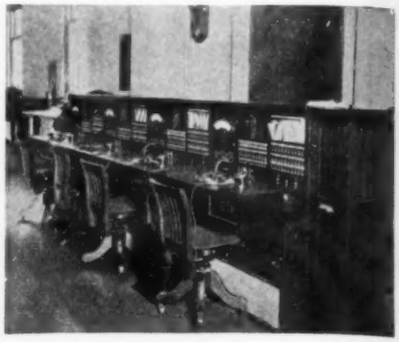
a given signal pulled the heat coils, disconnecting the lines from the manual board. As soon as this was completed the signal was transmitted to the new switchroom for the line relay groups to be dropped in place. In less than three minutes the entire job was completed.

Victoria telephone exchange building. Single story addition to house automatic equipment can be seen at rear

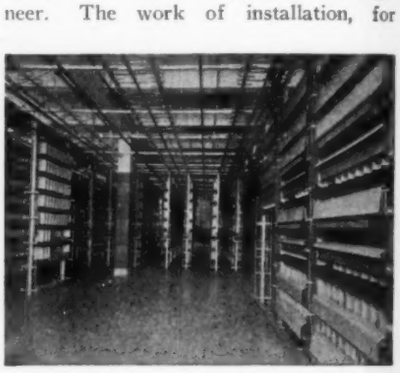
Almost immediately traffic began to flow through the new board, many people apparently having waited up to try out the new system. Visitors were then invited to partake of a buffet supper which had been prepared in the automatic switchroom.

in their experience. Much of the credit for the success of the project belongs to the Victoria commercial staff, headed by J. C. Paterson and the traffic department headed by N. G. Fitchpatrick, traffic superintendent, and especially to the members of co-ordination committee, the members of which were drawn from the various departments involved.

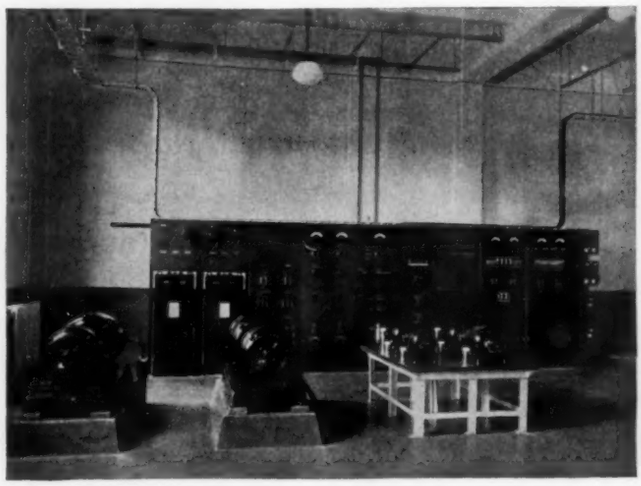
Besides those already mentioned, visitors and officials present at the cutover included Gordon Farrell, president of the British Columbia Telephone Co., E. F. Helliwell, commercial superintendent; neering Co. was represented by G. B. Rickards, vice-president and general manager; Roy Bowland, general sales engineer; George Knowles, sales engineer, and G. K. Haspel, automatic engineer. The work of installation, for which the same company was responsible, was handled by V. L. Bunkleman, who also directed the cutover procedure.



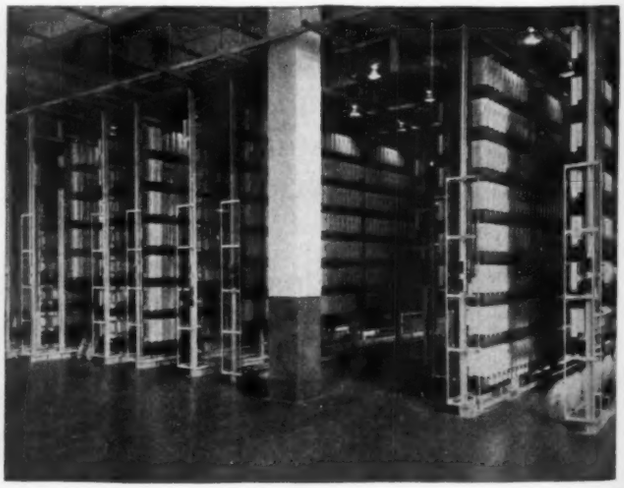
Test desks at Victoria, B. C.



General view of Victoria switchroom looking towards selector racks



Power apparatus for the Victoria exchange, showing duplicate charging machines, duplicate ringing machines, rectifier panels and power and fuse panels



View of selectors showing high frame mounting

On the Sunday and Monday following the cutover, the telephone traffic was slightly above normal, but the new equipment functioned with the utmost smoothness. In fact, some of the more mature automatic engineers present agreed that it was one of the "cleanest" cutovers Ralph Argue, Andrew Jack and Miss E. R. Walker of the traffic department, E. P. La Belle and N. J. Dunlop of the plant department, A. H. Lemmon, chief engineer; Sterling Ross, equipment engineer and C. H. McLean, transmission engineer. The Independent Sales and Engi-

Because of the desirability of providing for the ample expansion which is expected to materialize in Victoria in the next few years, no attempt was made to install the automatic equipment in the old building. Instead, a new one story struc-

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Modern engineering utilizes small units to perform important duties.

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In the Stromberg-Carlson Junior Multiple Switchboard, the No. 190 Type Line and Cut-Off Relays accurately control the signals to the operator.

One of the reasons for the ability of the Stromberg-Carlson Junior Multiple Switchboard to furnish modern telephone service economically is the use of this relay which is compact, rugged and reliable.

The armature and traveling contact springs are combined in one element --a construction that requires little magnetic effort to operate contacts.

The contacts are pure platinum--a guarantee of reliable connections.

All contacts are at the extreme front end--an arrangement that simplifies inspection and testing.

Stromberg-Carlson engineers will gladly send you descriptive matter explaining why the Stromberg-Carlson Junior Multiple Switchboard is the ideal switching equipment for the small office.

Write for Bulletin

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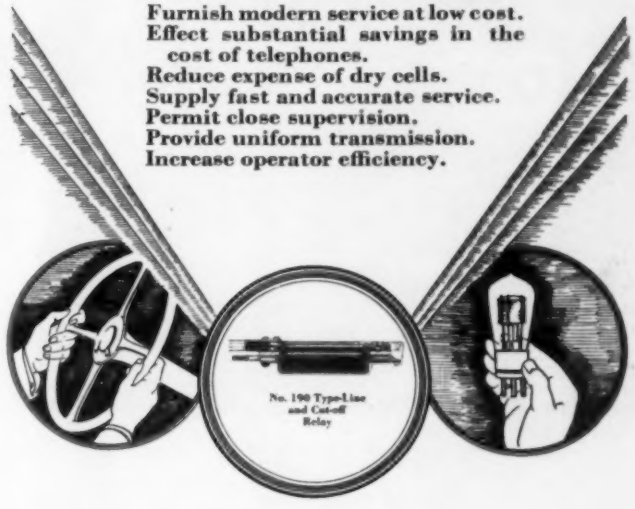
Furnish modern service at low cost.
Effect substantial savings in the cost of telephones.
Reduce expense of dry cells.
Supply fast and accurate service.
Permit close supervision.
Provide uniform transmission.
Increase operator efficiency.



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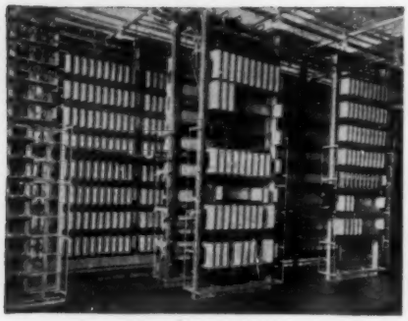


Close-up view of special switch racks and selector bays

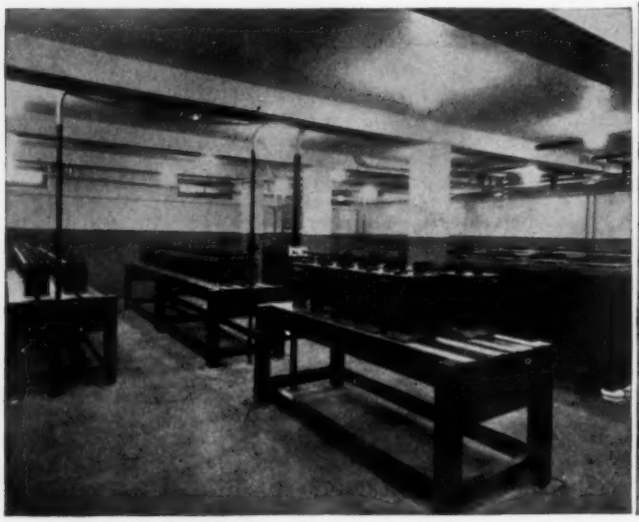
Special service desks at Victoria, B. C.

ture, especially designed to accommodate the high frames on which the Victoria switching equipment is mounted, was erected side by side with the old building, the main floor being occupied by the Strowger apparatus. That ample space has been allowed for growth is indicated by the fact that while the initial installation takes care of approximately 17,500 station terminals, the present switchroom floor space is extensive enough to take care of approximately 40,000 terminals. In addition the structure is so designed that other floors may be added whenever occasion requires.

bays and suites. Each bay is equipped with a panel on which are mounted supervisory signals and fuses, and traffic matter terminal blocks which are so arranged that traffic overflow may be recorded by individual shelves or by groups by the simple expedient of changing small U links on the terminal blocks.

through dialing to three suburban exchanges, Belmont, Colquitz and Gordon Head, now operating on a magneto basis. At the present time traffic to and from these exchanges, which are all of less than 100 lines capacity, is handled manually through the dial service "A" board. However, the switching equipment in Victoria is so arranged that, by making minor wiring changes, service between these exchanges and Victoria proper may be offered on a restricted or unrestricted automatic basis, or a combination of the two, as subsequent commercial developopments may dictate.

The largest proportion of the Victoria local service is on a flat rate basis, approximately ten per cent of the stations being on a measured service basis. Almost one-half of the stations are arranged for two-party working. These are full selective, ringing to ground from either side of the line, while there are a few four-party lines on a semi-selective (one and two ring) basis. Full line intermediate distributing frame facilities are provided so that any of the 11,000 line finder terminals may be cross connected to any connector terminal in the exchange.



General view of the Victoria battery room

Some of the staff of the British Columbia Telephone company in front of the Victoria telephone building. In the front center are James Hamilton, vice-president and general manager, and E. F. Helliwell, commercial superintendent

The automatic switchboard apparatus, while of standard Strowger design throughout, possesses several features of interest to the telephone technician. The subscribers' line equipment consists of 200 point Strowger line finders and line-and-cut-off relays mounted on standard four-foot shelves, with four shelves each of line finders and relay groups to the "bay." The switch bays are placed end to end in rows to form suites, which extend to a height of approximately 11 feet 6 inches above the floor. The selectors, connectors and special service switches are also mounted on four foot shelves, the shelves being similarly arranged in

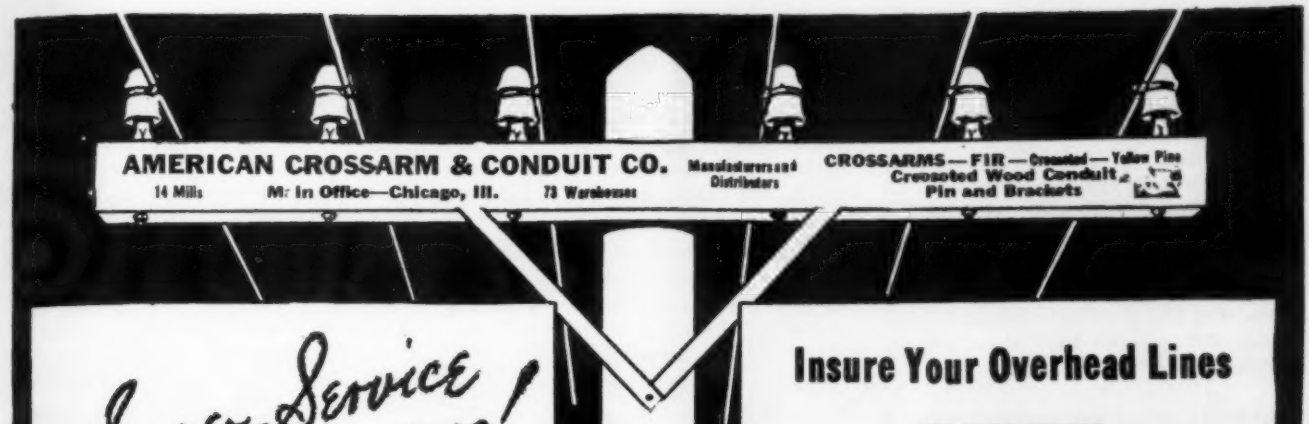
The numbering plan for the Victoria area involves the use of an office name and a four digit number. While only the first letter of the name is dialed the standard twenty-four letter metropolitan dial is used, and the choice of office names ("Empire" and "Garden") is based on the use of the third and fourth levels of the first selectors. The special service numbering plan is also in accordance with standard practices in North America, as follows:

Service and Suburban	0
Long Distance	110
Reverting Calls	119
Wire Chief	117
Repair Clerk	114
Information	113

The second level of the first selectors has been left vacant for the present to permit of facilities at some later date, of

The power equipment, which, except for the batteries, is installed in the automatic switchroom, consists of two 300 ampere motor generators, two 50 ampere rectifiers, and duplicate ringing machines. The power board was manufactured in the shops of the Independent Sales and Engineering Co., Ltd., Vancouver. An interesting feature of the power equipment is the use of bus-bar distribution to the Strowger switchboard in place of power cables, the bus-bar being suspended from the ceiling and separated from the frame by porcelain insulators.

The dial service "A" board installed in the old operating room is being used at



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Prompt Shipment from Minneapolis Yard.

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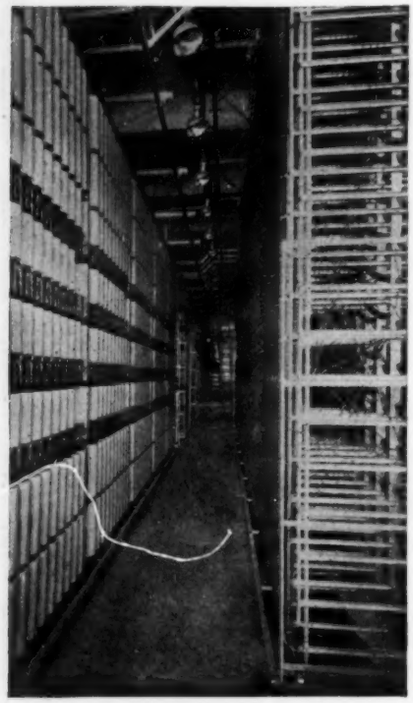
present for handling traffic to the suburban exchanges, for intercepting service and for subscriber assistance. Besides this there is a four position information desk installed in the same room and a four position test desk and a two position repair desk in the switchroom. All of this manual equipment, with the exception of the test desk, was built in the sales company's plant in Vancouver. The same toll board is being used as heretofore, the necessary modifications being made for adaptation to the Strowger automatic toll switch train.



An idea of the size of the Victoria switchroom may be had from this view, showing the aisle between the line I. D. F. and the line finder racks

The success and smooth-running progress of the Victoria installation in the few days it has been in service, and the enthusiasm of both the telephone company officials and the telephone users, augers well for the future of the Strowger dial system in the province of British Columbia. It is noteworthy that the Strowger system is the only dial telephone system used in Canada, east as well as west, and with the introduction of that system in the second largest city of British Columbia an excellent start has been made on a development program which should eventually place that province in the van of world telephone progress.

Western Telephone Corporation of Salina, Kan., has purchased the Gray County Telephone Company, which includes exchanges at Cimarron, Ingalls, Montezuma and Copeland, Kan.

TELEPHONE IMPROVEMENTS MANAGED WITH SPEED

The Crown Point Star of Crown Point, Ind., recently paid tribute to the efficient manner in which cables were laid in conduits along the main street of that city by the Illinois Bell Telephone company.

"Unlike such undertakings which usually litter up the city and hinder traffic for days, one would not know that a conduit had been laid on the street were it not for the army of workmen employed on the job," according to the Star article.

Special mention was made of Jack La Force, foreman for the company, who engineered the job.

"Foreman LaForce had the matter so well in hand that in a minimum of time the opening through the brick pavement and tuftread on North Main street was filled and surfaced as good as new with little or no interruption to business. This can also be said of the grass plots on North Main street where the sod was removed, the trench dug and filled up again with hardly a sign left to indicate the big piece of work laid beneath the surface. In a number of instances Foreman LaForce seeded various plots and in others sent into the country for sod and resoded the line of travel to leave the property just as he found it."

WESTERN ELECTRIC COMPANY SPECIAL DIRECTIONS RELATIVE TO INTERPHONE TRANSMITTERS

Never hit nor violently shake the transmitter.

Never attempt to adjust the transmitter nor loosen the nuts or screws holding the button in place.

When cleaning the external parts of the transmitter care should be taken not to depress the diaphragm.

This transmitter is intended for use on interphone circuits and should at no time be allowed to receive a current of more than .015 ampere.

It is suggested that users be cautioned:

Never, under any circumstances, to hit or touch the diaphragm of the transmitter.

When talking, to place the lips close to the mouthpiece and speak in a firm tone of voice.

IMPROVE TELEPHONE PLANT AT BRYAN

The Southwest Telephone Company of Bryan, Texas, has completed all plans for extended improvements and enlargements of its plant, according to Ben H. Noel, the manager. The work will apply to both the Bryan and A. & M. plants, and will be under the direction of I. H. Humphreys. Extensions will be made in the congested areas in Bryan, in the outskirts of the city and into the rural districts. Improvements will be made in the trunk lines leading to the A. & M. College. The College Park plant will be rebuilt and a toll line built to Caldwell.

TELEPHONE LINES TO BE UNDERGROUND

Incidental to the paving of streets in Swea City, Ia., the city council has ordered the removal of toll line poles by the Bell Telephone Company on the town's main street. Although local telephone wires were placed in underground cables some years ago, the toll line poles have not been removed.

(*Continued from page* 18.)

Runzel-Lenz Electric Mfg. Co., Chicago.

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Stewart Bros., Ottawa, Ill.

Stromberg-Carlson Telephone Mfg. Co., New York.

Suttle Equipment Co., Lawrenceville, Ill.

Telephone Engineer Publishing Co., Chicago.

Telephony Publishing Corp., Chicago.

Templeton, Kenly & Co., Ltd., Chicago.

Unique Mfg. Co., Inc., Chicago.

USL Battery Corp., Niagara Falls, N. Y.

Wagner Directory Co., Inc., Freeport, Ill.

P. Wall Mfg. Supply Co., Pittsburgh, Pa.

TELEPHONE COMPANY AT ALEDO RUSHES IMPROVEMENT WORK

Aledo, Ill.—Work on the $40,000 improvement project of the Western Illinois Telephone Co. of Aledo is progressing nicely, according to Chas. Holsclaw, resident manager of the plant, and with favorable weather the entire project is expected to be completed by the first of the year.

The outside work of remodeling the office at the corner of East Fifth and South Maple streets is completed and workmen are now busy on the interior work. The entire inside of the office is being redecorated and some improvements are being made including the installation of additional switchboard facilities to handle an extra 100 lines.

The outside work is also being rapidly installed with over half of the cable in the air at the present time. Approximately six miles of overhead cable is being used in addition to 3,000 feet of underground cable and when completed there will be no open wires in the business district. The work is being done under the direction of Lloyd McCaslin, foreman.

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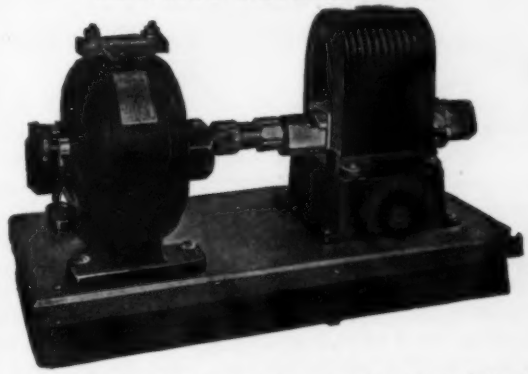
Magneto - Ringing - Motor - Generators
ALWAYS DEPENDABLE



These units effectively replace all old-fashioned hand and battery ringing methods. Extreme simplicity of operation and low cost offer advantages over all other devices.

Cuts operating expenses by eliminating expensive and troublesome battery equipment.

Make possible a swift, sure, carefree service that pleases both subscriber and operating company as well.

Can be supplied for any voltage or special current. A thorough test will convince you.

Complete data and specifications on request.

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The Telephone Trickle Charger

Improved Apparatus Fast Eliminating Much of the Telephone Man's Troubles, Says Ray Blain, in Another of His Interesting Articles on New Equipment in the Telephone Industry

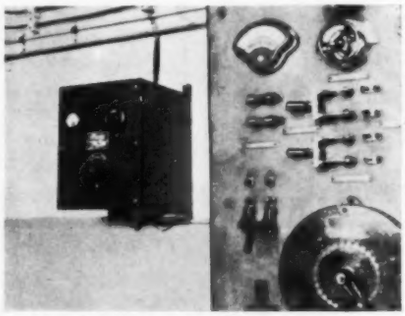
Development and improvement of apparatus is fast eliminating many of the hard working telephone man's worries. Perhaps the greatest improvement or at least the one which is being more generally accepted is the sealed jar type storage battery and trickle or floating method of charging. Trickle charge is that practice whereby the amount of charge is adjusted to replace the current taken from the battery during a certain period plus the local action loss. To maintain this continuous charge at a low rate and at an economical power cost special rectifiers have been designed which are entirely satisfactory for the small or medium sized exchange. I have every reason to believe that in the not far distant future all exchanges of this type will make use of these batteries and will employ one or more of the trouble-proof rectifiers to keep them fully charged at all times. Another real advantage of charging a telephone battery by this method is that the voltage of the battery is kept near constant at all times. The assurance of a continual supply of pure direct current always available without fuss or bother is an advantage that will not long be passed up by the progressive telephone managers, and I believe this type manager is in the great majority.

Trickle Charge Equipment

Motor-generator charging equipment is not generally considered economical for charging at a small rate and has the additional disadvantage for trickle charging that some means must be provided for opening the circuit when there is any interruption of the primary power supply. Mercury arc rectifiers are also more efficient at higher rates than generally required for trickle charging in the average telephone exchange and have the disadvantage that they are not easily started automatically after the power supply comes on again following even a short power failure. I believe that either the electrochemical or the electron tube type will be found more satisfactory for trickle charging in the average exchange. The electron tube type rectifiers are generally known as the "Tungar" or "Rectigon" type. Either of these small chargers are ideal for maintaining storage batteries at the PBX switchboards, which is a much cheaper and better arrangement than supplying battery from the main exchange over a number of cable pairs. This is especially true when the PBX loops are working through a congested cable.

Electrochemical Rectifiers

This new type rectifier is very simple in principle as it consists of two plates immersed in an acid solution. One plate is lead and the other a special metal suitable for this purpose which, at the present time, is usually tantalum. Current will flow from the lead to the tantalum but not back from it to the lead. This action takes place regularly and normally and is not effected by temperature, voltage or frequency variations. The new type electrochemical rectifiers should not be confused with the old style, which



New type trickle charger installed near power panel

was corroded quickly by the electrolyte which made its replacement frequent. The new tantalum plate does not corrode and nothing is consumed except a small amount of water. Another advantage of the new type is that there is no variation in the charging rate regardless of the age of the rectifier. The plates of the new type are "self-healing"—that is, if one of the cells should break down due to some abnormal condition the cell would reform immediately and continue to function as though there never had been any trouble.

Electron Tube Rectifiers

Most everyone is familiar with the electron tube or gas filled bulb rectifier generally referred to as "Tungar" or "Rectigon" for ordinary battery charging, but it is only recently that they have been adapted to the use of trickle charging a telephone storage battery. These chargers consist principally of one or more bulbs, a transformer and some means of regulating the output, such as a resistance or reactance. The gas filled bulb in its usual form consists of a tungar filament which serves as the cathode and a graphite plate as the anode. This forms a simple one-way valve, which rectifies only one-half of the alternating current wave. These bulbs are filled with an inert gas, such as argon, which becomes ionized by the electrons emitted by the cathode, and while ionized permits current to flow through the tube.

Full wave rectification is obtained by connecting two half wave bulbs with a split secondary transformer so that each bulb takes care of each half cycle. Many have condemned the half wave rectifiers because they claimed that they could not be more than fifty per cent efficient due to only one-half the cycle being used. This is a mistake, as there is no load on the half cycle not being used and the half wave is as efficient as the full wave. While the half wave rectifier is suitable for charging ordinary batteries, its pulsating current causes an objectionable hum in the talking circuits of a telephone system if used to charge its batteries. For this reason the bulb type trickle chargers designed for telephone use have the full wave principle with suitable choke or filters in their output circuits, and are absolutely noiseless. As a result of many years' development work the gas filled tube has reached such a degree of perfection that when operated at its rated capacity it will have a long and uniform life, probably well over 4,000 hours' actual operation. Reports of bulbs in service continuous for over a year are not at all uncommon. The efficiency of these rectifiers are as high as 77% when charging batteries of a voltage near the maximum of which the set was designed.

One of the electron tube rectifiers designed primarily for small telephone systems makes use of two 2-ampere tubes and provides full wave rectification. This set is very flexible, as it has suitable secondary taps which permits operation on 9 to 24 cells of battery. A rheostat controlled from the panel gives very close adjustment of the charging current over a range of 1 to 3 amperes. An ammeter is also provided to indicate the charging rate. Suitable filter reactance is incorporated in the set which provides extremely quiet operation of the rectifier on a telephone battery.

A large capacity filter reactance has been designed which, when connected in the external direct current circuit makes the 12 ampere standard tube rectifier suitable for telephone service. The output of this rectifier is controlled by means

3-bar $9.00

4-bar $10.50

5-bar $11.50

Suttle Special Style B Magneto Wall Compact

HERE is a telephone that offers a solution to the exchange manager who must replace obsolete equipment in stations where the returns will not pay for an investment in high priced equipment. This telephone has the appearance and transmission qualities that will make it highly satisfactory to your subscriber. It is entirely modern in design and wiring, and the workmanship is so careful and thorough that the instrument will give years of service with a minimum of maintenance.

Mail the coupon below for a complete description of the design and construction of this, and other Suttle telephones

SUTTLE EQUIPMENT CO.

Lawrenceville, Illinois

Suttle Equipment Co., Lawrenceville, Illinois.

Please send me detailed information about your Suttle Special Style B wall compact telephones. No obligation.

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THEY laughed at Columbus when he told them the world was round. But he stuck to his idea—and won!

We, too, have stuck to an idea—the idea that a new world of pliers—better than anything heretofore produced—lay just over the horizon.

The Professional Lineman pattern illustrated here is a striking example of the perfection that can be obtained in pliers construction.

Many subtle differences distinguish these pliers from other pliers of their type. Faultless in design—beautifully balanced — massive without being head-heavy—smooth riding joints—accurately aligned cutters that retain their alignment—tremendous leverage for greater cutting and gripping power. Qualities that lend speed and efficiency to the hand of the lineman.

Hammer-forged from our own special formula electric furnace tool steel, a high carbon Molybdenum alloy, each pair individually hardened by liquid heat process and subjected to four separate electric tempering operations applied locally to joints, cutting blades, gripping jaws and handles.

PURCHASING AGENTS:

You can save real money for your company by placing these long-wearing pliers in the hands of your men. Order a few pairs today for running test.

Catalog of over 50 Vacuum Grip patterns and sizes on request.

Vacuum Grip Professional Lineman Pliers

No. 58—8½", $3.50
No. 57—7", 2.75
No. 56—6", 2.25

Name of Company or lineman etched Free on handle of each pair.

FORGED STEEL PRODUCTS CO., Newport, Pa.

Vacuum Grip

REG. U.S. PAT. OFF.

Pliers

Built UP to a Standard—Not DOWN to a Price

OVER 650,000 IN USE

of two dial switches connected to 15 sets of secondary taps. This makes possible a fairly close adjustment of current for any charging rate up to a maximum of 12 amperes. This adjustment is quite necessary on trickle charging of a telephone battery. While this charger has a nominal direct current rating of 6 to 90 volts, it is not recommended for more than 65 volts when used with the filter reactance, as the output is cut down by the high inductance of the filter. However, this voltage is the highest usually required for charging in the average telephone exchange. The efficiency of this rectifier at full load is about 76%.

Trickle Charge Operation

There are many instances where a trickle charger could be installed in a telephone exchange to advantage and it would pay for itself in current saved alone in less than one year. Added to this is the advantage of knowing that maximum life and service will be obtained from the battery. Even if the battery is old when the trickle charger is installed there is every probability that its life will be extended several years by this method of charging over what it would be if the manually cycled method was used. Also considering that a part of the inside man's time must be devoted to care of the batteries with the use of the old method, the trickle charge is so dependable that it removes all the worry and bother from battery maintenance and the time of the inside man can be used where it is more valuable.

Trickle chargers are all small and easy to install and can be mounted either on the wall or on one side of the regular power panel. The old charging equipment can be left installed if desired to give the battery periodic equalizing charges. However, if the rate is properly adjusted on the trickle charger when it is installed and not tampered with later, this equalizing charge will be at infrequent periods, probably not oftener than once per year. There is always a great deal of satisfaction in knowing that the battery is at least 80% charged at all times and that due to the neglect of a battery attendant there is no danger of a power failure finding the battery nearly discharged so that it will not carry the system over the period that the power is off. Yes, trickle charging insures ample battery capacity at all times. Of course, in larger exchanges power failures are guarded against by the installation of gas engine charging sets, but this expenditure is not considered justified in the smaller exchanges.

Operation of Trickle Chargers

As the trickle charger is used to replace the current taken from the battery over each 24-hour period, the battery should be fully charged before it is connected in service. Numerous adjustments of the rate will likely be necessary when the charger is first placed in service, until such time as the correct rate of charge can be determined. After it is thought that the correct rate has been arrived at it should not be changed until sufficient time has elapsed to make certain that the rate is either too high or low. A trickle charger carefully selected to meet the requirements and needs of your particular exchange, properly adjusted and then left alone will give years of absolute satisfaction without bother or worry. Trickle chargers in the telephone world are comparatively new, but they are being rapidly investigated by wide-awake managers, and I feel sure that the time is not far distant, when an exchange without one or more of them in service, will be as rare as one today without some type power ringing equipment.

TELEPHONE WIRES TO GO UNDERGROUND

Permits for street openings having been granted, it is expected that the Illinois Bell Telephone Company will soon start work on the project of placing a large telephone cable on Maple avenue in Downers Grove, Ill., underground Citizens of Downers Grove have expressed their desire for a hidden underground cable, since the present cable spoils the appearance of the Methodist church.

Associated Telephone & Telegraph Company has declared an extra $2 cash dividend for 1930 on its $4 class "A" stock and has established the policy that this $2 extra will be paid regularly in the future as earnings warrant.

Here Is What You Have Been Waiting For

A thorough, authoritative handbook of the fundamentals of telephony

By KEMPSTER B. MILLER

This book lays a complete and dependable foundation for the study of telephony, comprehensively reviewing the development of this industry, and describing the basic theory and elements of apparatus involved in all telephone practice.

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3. Early History of the Electric Speaking Telephone.
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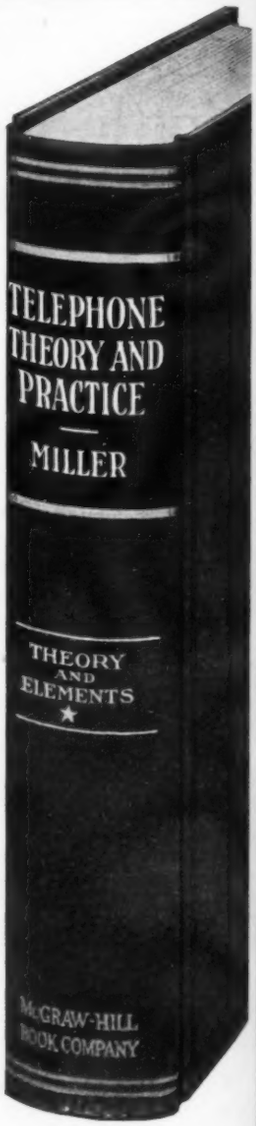
5. The Vibrations of Sound.
6. The Sensation of Sound.
7. The Kinds of Sound.
8. Voice Currents.
9. Vacuum Tube Theory.
10. Magnetic Materials.

Part III—Elements of Apparatus

11. Wires for Equipment Use.
12. Coils and Electromagnets.
13. Resistors.
14. Condensers.
15. Flexible Cords.
16. Joints and Contacts.



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RAY-O-VAC

With Manufacturers and Jobbers

BOOKLET DESCRIBING CLAY CONDUIT

The National Fireproofing Corporation has published a 30-page booklet which describes the advantages of Natco Underground Clay Conduit, both editorially and pictorially.

The Natco Mitered Conduit, which is a new shape providing simple and flexible means of constructing perfect curves in underground lines of clay conduit, is stressed particularly. This is made in one segmental form, in all multiple and single duct shapes, and in either flat or edge positions.

Mitered conduit may be used to construct simple or reverse curves in either horizontal or vertical planes. Its great advantage is that it eliminates the need of manholes at bends or turns and especially at approaches to central offices from the street or alley. It allows intricate curves to be constructed to meet local conditions without the confusion of special shapes or the expense of cutting, fitting or spacing.

Two new shapes of conduit—branch and transposition—are also described.

One end of branch conduit is the same shape and size as standard conduit, while at the opposite end the individual ducts are more widely separated by means of double webs so as to permit alignment with abutting branch lines. Brand conduit permits the division of multiple duct main lines into two or more branch lines, each having a smaller number of ducts than the main line.

Natco Transposition Conduit is said to solve construction problems presented by underground street obstructions and facilitates changing the position of cables on approaching manholes, cable vaults, viaducts, bridges or other crossings.

A copy of the booklet may be obtained by request to the National Fireproofing Corporation, Fulton Building, Pittsburgh, Pa.

FOLDER SUPPLEMENTS NATIONAL ADVERTISING

An interesting folder designed to show how national advertising in 56 magazines would tend to educate thousands of persons in the many uses they can make of solder, has just been mailed to dealers by the Kester Solder Co., 4201 Wrightwood avenue, Chicago.

It clearly demonstrates to possible retail dealers of Kester products the assistance they would receive from the national advertising.

Crediting Kester's consistent, continuous advertising, the folder announces that today there are over fifty times as many individual solder consumers as there were 20 years ago. These figures are based on recent comparisons of sales through retail outlets in 1910 and 1930.

TO INSTALL LEICH BOARD

The Farmers Telephone Co. of Lee County has recently placed an order with the Leich Electric Co. for a new 100-line magneto switchboard to be installed at Lee Center, Ill.

This company operates five exchanges, all of which have Leich switchboards.

They have always taken great pride in giving the very best service possible to their subscribers and have spared no expense in keeping their plants and equipment in the very best condition.

The company's affairs have been ably looked after by the following officers: George Schafer, president and general manager; C. W. Bowers, secretary and treasurer, and Ed. Berry, superintendent.

PURCHASES STROMBERG-CARLSON

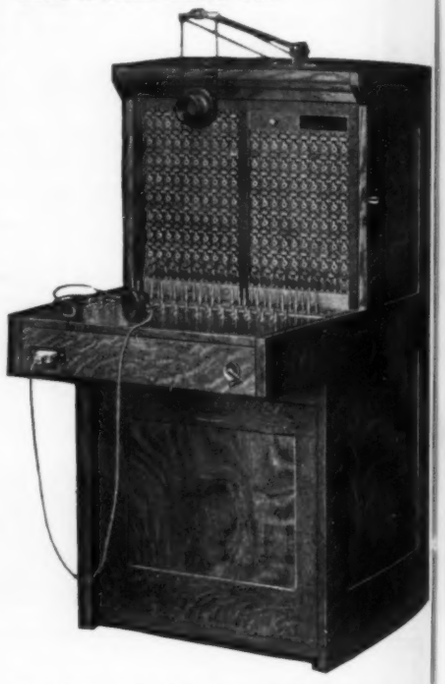
The Farmers Telephone Company of Jeromesville, Ohio, has purchased a No. 105-B Stromberg-Carlson magneto switchboard for Jeromesville. This company operates exchanges at Jeromesville and Perrysville. J. F. McClure is secretary and general manager of the company.

CRYSTAL LAKE, IA., EXCHANGE IMPROVES ITS SERVICE; INSTALLS NEW KELLOGG MAGNETO SWITCHBOARD

By O. F. Schollenberger, Representative, Kellogg Switchboard & Supply Co.

Twenty-seven years ago the North Crystal Rural Telephone Co. of Crystal Lake, Iowa, was organized. The company had ten town telephones and twenty rural telephones—not a large number, but it represented a start, anyway. Through a sincere effort to give their customers the best service possible since the day of the company's founding, they have built up the system to twenty-five telephones in town and 120 in the country. This is quite an accomplishment in a town of its small population. To take care of this steadily increasing business the company has recently installed a new 150-A Kellogg magneto switchboard.

The board is wired for 100 lines and fifteen cords of which thirty lines and ten cords are equipped. The new board is of the newest design and has greatly speeded up service. The increased efficiency and better transmission has attracted many new customers to the company and increased the satisfaction of the old customers. Needless to say, the improved service has been a welcome addition to the town's public possessions. It is hoped that the company will continue in its prosperity, and from all appearances it seems that it will.



This board is similar to the board used by the North Crystal Rural Telephone Company. It is equipped for 150 *lines rather than* 100.

The men who have been responsible for its success and who are continuing to direct the company's activities are: J. C. Kuck, president; Earl Hobbs, vice-president, and Lawrence Siekmiere, secretary and manager.

TYPICAL OHIO HOME

By Ray Blain

I recently had the pleasure of visiting a typical American home of the old school in a small town down in the Buckeye state. The house, although old, was a thing of beauty with its large high ceiling rooms and halls and numerous large porches which makes our modern quarters seem cramped. The house was lighted with gas and the plumbing could not be considered strictly modern. The telephone was a local battery, the name plate stating that it was manufactured by the North Electric Company, Cleveland. This instrument, although old and ancient, was giving excellent service and I found its transmission near perfect on a long distance call.

The only sad part about this visit was

THE NEW STEWART TEST SET

Tells distance and direction to trouble without opening the line. Equipped with Detector Coil, which is connected to receiver by plug and jack.

Test Set comes complete with all cords and clips, battery, etc., ready for use. Has Head-band for Receiver.

Sent on ten days' trial.

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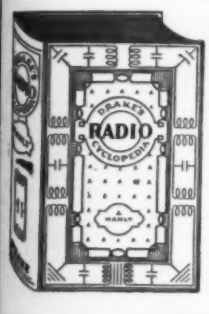

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By HAROLD P. MANLY

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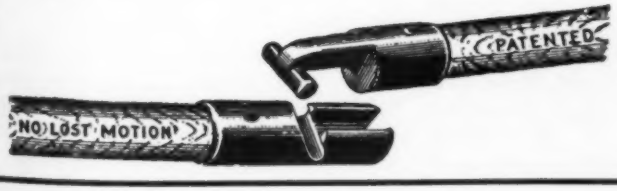

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the fact that the home was being broken up as the mother had passed on to her reward and the father was being taken into the home of a well meaning daughter in Chicago. The breaking up of a home is always a sad process, and more so in this case as the couple had lived together 58 years, and one almost envies the one called first.

After visiting this old home and comparing it with present standards of living it seems progress in many ways is exacting a tremendous price. In the first place, with hasty marriages and easy divorces, few couples of the present generation will ever reach their golden wedding anniversaries. The modern home does not always have the homey atmosphere, as in many cases about all that it is used for is a place to change clothes on the way from the office to a party and from the party to the office. Edgar Guest was right when he said, "It takes a lot of living in a house to make it home."

In keeping with modern trend, the majority would not tolerate an old local battery telephone but would demand a handset, though you would be fortunate indeed if you found them home long enough to answer it. The North Electric Manufacturing Company now have a modern factory at Galion, Ohio, and manufacture the ultra modern "All-Relay" automatic with exchanges in operation all over the country. While their present product is as perfect as a telephone apparatus can be made at the present time, I doubt very much whether they have ever manufactured a piece of apparatus that has proved of more benefit to man or produced more satisfaction than has that old local battery instrument installed in that old fashioned house where for a score of years it has conveyed countless messages of joy or sorrow and played an all important part in the making of a happy American home.

M. D. WOOD, RADIO MANAGER FOR HEATON'S STORE

Heaton's Music Store of Columbus has just announced that Morris D. Wood, for the past 17 years radio and telephone representative for the Stromberg-Carlson Telephone Manufacturing Company in Ohio, has been appointed sales manager of its radio and Victrola department.

Mr. Wood has had long experience in both telephone and radio fields. He started his telephone career in the Switchboard Installation Department of the Western Electric Company in New York City. He later went with the Dean Electric Company, remaining in the installation work. Later, he became associated with the Missouri & Kansas Telephone Company of Kansas City, as Power Plant Inspector. In 1913, Mr. Wood returned to the Dean Company as its representative in Ohio and West Virginia. When Stromberg-Carlson absorbed the Garford Company, Mr. Wood joined them as representative in Ohio. Mr. Wood has made a host of friends in his territory and they are very glad that he is remaining in his old district.

According to a report from the Stromberg-Carlson Company, T. C. Thompson, veteran installer, will fill the vacancy left by Mr. Wood. Mr. Thompson has been associated with telephone work for the past nine years and with radio since 1925. He began his career with the Illinois Bell Telephone Company in 1921, installing apparatus over the entire state of Illinois. He severed relations with the Illinois Bell in 1924 and became associated with the Citizens' Independent Telephone Company, at Terre Haute, Indiana.

J. E. Finley, senior Ohio representative of the Stromberg-Carlson Telo. Mfg. Co.

M. D. Wood, new radio manager for Heator's store of Columbus

Five months later, he went with Stromberg-Carlson, in the Installation Department, and in six months was placed in charge of installations in the Rochester Telephone Corporation's Exchanges. He directed this work up to the time of his appointment in Ohio territory.

J. E. Finley will remain as Senior Representative in Ohio for Stromberg-Carlson. Mr. Finley also has had long experience in both telephone and radio. He became associated with the Rochester Company in 1906, at which time he was sent to Syracuse to install equipment in that exchange. After two years with the company, he went to Chicago to work in the Installation Department of the Chicago Telephone Company. In 1907, Mr. Finley went with the New York Telephone Company and, for the following seven years, he was Central Office Inspector and Tester for that company and the Western Electric Company.

T. C. Thompson, new Stromberg-Carlson representative in Ohio

Mr. Finley returned to the Stromberg-Carlson Installation Department in 1916 and with the exception of two years with the Junction City Telephone Company at Junction City, Kansas, and the Citizens' Independent Telephone Company of Terre Haute, he has been with the Company since that time. In 1925, he became sales representative in Ohio.

Heston-North, Inc., of Cincinnati, F. Howard Waite, Inc., of Cleveland, and Crawford-McCauley, Inc., of Pittsburgh, Stromberg-Carlson representatives, will be in charge of radio sales in Ohio.

Farmers residing north of Bison, S. D., have recently completed installation of a telephone line running north out of Bison. Farmers interested in telephone service did the work themselves.

(*Continued from page 27.*)

was the basis of the next demonstration. This device makes speech possible for the unfortunates who have lost the use of their vocal cords through an operation, paralysis, etc. I never knew before what connection this device had with the telephone business until Dr. Grace explained how he restored speech to a lady in Dallas who had not spoken a word in two years. Imagine what that woman would do to her telephone! A concern which will go to such extremes to get business deserves to prosper.

Inverted speech was then explained. With this apparatus you talk into a microphone in the regular manner and the words emerge in a scrambled or garbled form. The sounds are completely unintelligible, akin to an argument between a couple of Chinamen. The miracle is performed when this scrambled speech is spoken back through the machine and comes out clear and distinct and intelligible. The principal use of this device is in the transmission of the spoken word across the ocean with secrecy. It eliminates the possibility that radio receiving sets might pick up a private telephone conversation.

The possibilities of amplification were next shown. A man's normal heart beat was made to sound like a base drum, the working of the jaw muscles like distant thunder, and the blood rushing through a brain tumor like a roaring waterfall.

By the means of phonograph records, music between the frequencies of 350 and 2,300 cycles was compared to that within the limits of 1,200 and 2,000 cycles. This indicated clearly what is wrong with some of our radio loudspeakers.

The next demonstration was that of dialling numbers into a machine which converted the same numbers into spoken words. The number 4321-J was dialled over a toll line from Chicago into the Bell Laboratories in New York. A voice which traveled back over another line announced the numbers to those gathered clearly and distinctly through the loudspeakers.

Dr. Grace's "miracle program" was closed with the dialling of numbers on the New York system from an ordinary telephone in Chicago. When the receiver was removed from the hook the dial tone was plainly heard in the loudspeakers, then the dial clicks as the numbers were being dialled, then the ringing tone and finally the voice of the answering party. Several persons in the audience stepped to the stage and dialled friends in New York with the ease and dispatch of an ordinary local call. This development makes possible one grand step forward in the use of dial telephony and will open up a new long distance service. You will simply call the long distance operator and state the number and city desired. She will then dial your number in the distant city over a direct toll line and make almost instantaneous service possible.

Yes, we are progressing in this telephone world of ours and, to quote the closing remarks of Dr. Grace, "in the parlance of Al Jolson, 'you ain't seen nothin' yet.'"

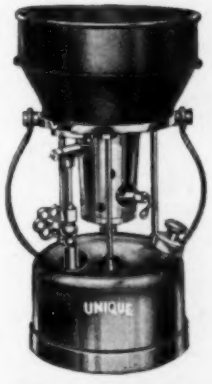
MAY SUBSTITUTE TELEPHONES FOR STENOGRAPHERS

A telephone company at Toronto, Canada, is trying out a device which may do away with stenographers. A business man merely calls "central" and is connected with the "letter department" which receives his dictation upon a mechanical record. His letters are promptly transcribed on his own stationery, envelopes addressed and a motorcycle messenger has them at his office a few minutes after the dictation is given.

FOR SALE

Growing exchange in Montana consists of six room house and lot on the Main street; Western Electric switchboard, 200 line capacity; 800 feet new cable. Net income about $250.00 per month. Good opportunity for live wire to build this into a worthwhile exchange. Price very reasonable. Address F. B., % Telephone Engineer, 192 N. Clark St., Chicago, Ill.

Furnaces **UNIQUE** Torches



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FOR SALE—Used equipment just removed from service because of cutover to automatic. No. 1317-R. W. E. 5-bar 1600-ohm Wall Telephones, $7.00 each; No. 300-M W. E. 5-bar 1600-ohm Bell Boxes, $7.00 each; No. 300-K W. E. 5-bar 2500-ohm Bell Boxes, $7.00 each; 2 No. 1320-A W. E. Common Battery Street or Mine Telephones, $20.00 each; No. 1040-AL W. E. Desk Stands, $5.00 each; No. 1533-A W. E. Common Battery Wall Sets, $5.00 each; No. 7 and No. 20 3-slot Gray Pay Stations, $3.00 each; No. 1001-A. W. E. Hand Test Sets, $3.00 each. All in good working order. Also 1 No. 550-B W. E. 80-line PBX Switchboard, $200.00. 1000 lbs. switchboard cable at junk prices. Over $2000.00 worth of equipment already disposed of without a single complaint. Numerous other items at equally attractive prices. The Orange County Telephone Co., Middletown, N. Y.

TRAVELERS select the Great Northern for its wonderful location in Chicago's "loop". They return because the large comfortable rooms, homelike environment, attentive service, excellent food and moderate charges make it an ideal hotel.

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$2.50 a day and up

Sample Rooms
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Dearborn St. from Jackson to Quincy
New Garage One-Half Block

KELLOGG SUES A. T. & T. FOR BILLION IN DAMAGES

Buffalo, N. Y., Oct. 4.—Two suits involving $1,500,000,000 were filed in federal court late yesterday against the New York Telephone Co. and the American Telephone & Telegraph Co. by the Kellogg Switchboard & Supply Co. of Chicago.

The suits charged the defendant companies with patent infringement, and sought injunctions against the manufacture of such apparatus as the improved trunk line circuit and the flickering recall, pending settlement of the suits.

The Kellogg company named no specific amount that it sought as damages, but alleged that the patent infringements had continued for a period of ten years, which, on the basis of the business done by the defendant companies during that period, would make the damages, if any should be found, run well past the $1,000,000,000 mark.

The Kellogg company alleged that one subsidiary of the American Telephone & Telegraph Co.—the Western Electric—alone had a business volume of $411,000,000 in one year.

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Western Elec. No. 317 inside connection 3-bar 1000-1600 or 2500 ohm Bdg. compacts @	$ 9.25
Stromberg Carlson No. 896 5-bar 1600 ohm Bdg. compacts @	10.50
Kellogg No. 28 desk set (old type heads) complete with W. E. 3-bar 1000-1600 or 2500 ohm external post connection signal set @	8.00
Kellogg No. 28 desk set with unbreakable head complete with W. E. No. 315 inside connection 3-bar 1000-1600 or 2500 ohm signal set @	10.00
Leich Elec. desk set complete with W. E. 3-bar 1000 or 1600 ohm external post connection signal set $7.75—4-bar @	8.75
New Cabinet inside connection compacts with Kellogg or W. E. Transmitters & Rec. 3-bar 1000-1600 or 2500 ohm $9.50—4-bar @ $10.50—5-bar @	11.50
Kellogg No. 79 C. B. Induction coils @	.40
Western Elec. No. 22 3-bar Bdg. Generators with cranks @	1.65
Stromberg 4-bar A. C. or Pulsating current Gen. with crank @	2.25
Automatic Elec. Slip type Receivers with New W. E. Shells & Cords @	1.10
Kellogg Local or C. B. Transmitters complete with backs @	1.10
Western Elec. No. 323 Transmitters complete with backs @	1.25
Western Elec. No. 143 Receivers complete with cords @	1.25
Western Elec. No. 240 External post connection 3-bar 1000-1600 or 2500 ohm Bdg. magneto hotel sets with W. E. Trans. & No. 122 Rec. @	5.75
Western Elec. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm desk set signal sets with No. 13 Ind. Coil @	4.50
Western Elec. No. 315 inside connection 3-bar 1000-1600 or 2500 ohm desk set signal sets @	5.75

Write for Our Bulletin
REBUILT ELECTRIC EQUIPMENT CO. Not Inc.
1940 W. 21st St., Chicago

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912,

of Telephone Engineer, published monthly at Chicago, Ill., for October 1, 1930.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared J. A. Smith, who, having been duly sworn according to law, deposes and says that he is the business manager of the Telephone Engineer and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher—Telephone Engineer Publishing Company, Chicago, Ill.

Editor—None.

Managing Editor—J. A. Smith, Chicago, Ill.

Business Manager—J. A. Smith, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) —Telephone Engineer Publishing Co., Chicago, Ill.; Harold L. Beyer, Chicago, Ill.; P. Kerr Higgins, St. Louis, Mo.; Agnes M. Leffert, Coldwater, Mich.; W. J. Uhl, Logansport, Ind.; Mrs. W. J. Uhl, Logansport, Ind.; F. A. Bowdle, Cerro Gordo, Ill.; J. A. Smith, Chicago, Ill.; John H. Wright, Jamestown, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.) —W. H. Graffis & Sons, Chicago, Ill.; W. H. Graffis, Star City, Ind.; Herb. Graffis, Chicago, Ill.; Joe Graffis, Chicago, Ill.

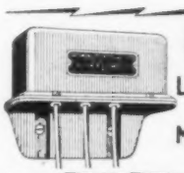
4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

J. A. SMITH,
Business Manager.

Sworn to and subscribed before me this 7th day of October, 1930.

(Seal) Carl A. Johnson,
Notary Public.

(My commission expires Feb. 21, 1932.)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